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UNIVERSITY OF ALBERTA
FACULTY OF ARTS AND SCIENCE
(Department of Political Economy)

A THESIS

PRODUCTION AND EMPLOYMENT IN ALBERTA

Submitted in partial fulfilment
of the
requirements for the degree of
Master of Arts

(Master's Program: six graduate courses
in addition to this thesis)

by

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#15.

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PRODUCTION AND EMPLOYMENT IN ALBERTA

In discussing the present pattern of production and em-employment in Alberta this general outline will be followed. First, a picture of the production of Alberta in 1941 by industrial groups is given. Following which a comparison of Alberta with the other provinces is made in relation to primary and secondary production, and in the degree of diversification each province has reached. Next, a general view of Alberta is presented, wherein the broad trends of production and Alberta's contribution to Canada's total output, is developed.

After this general presentation, a breakdown of Alberta's 1941 production is examined. A comparison of the commodities produced within the major industrial groups of Alberta is then made with those produced in the other provinces. Consideration also is given to the degree of diversification within these industrial groups in each of the provinces. A statement touching upon the trends within the main production groups of Alberta is followed by an estimate of the external trade of the Province in relation to the export and import of commodities.

Employment in Alberta is then discussed and the relative importance of the different industrial groups in providing jobs is considered. Next, comes a description of the location of Alberta's natural resources, and her chief manufacturing centres. Consideration is accorded also to where rural Albertans now live and to the shifts that are taking place in the rural population.

Finally, an introduction of the factors which influence the location of industry is brought in and an attempt is made to weigh their probable effects on future industrial expansion within Alberta.

I. PRESENT PATTERN OF PRODUCTION IN ALBERTA

PRODUCTION BY INDUSTRIAL GROUPS

Gross and Net Production in Alberta, 1941.

The Province of Alberta had in 1941, a total gross production of $443,175,858 as shown by Table 1. In terms of net production[1] the above figure would be $276,898,177 or 5.87 per cent of the net production of the Dominion.

Closer inspection of Table 1 will reveal the predominating position occupied by agriculture which accounted for 58.3 per cent of the total net production. Two other industries stand out from all the others, namely, manufacturing and mining, their combined contribution being approximately 28 per cent of the total, divided about equally between them. The construction industry, which is subject to quite wide fluctuations, made a net addition of 5.7 per cent. The value of the products of the remaining industries, forestry, fishing, trapping, electric power and custom and repair, made up about 8 per cent of the total net production.

It may also be seen from this Table that the primary industries of the Province were responsible for nearly 75 per cent of the total net production.

Comparison with the Other Provinces.

Alberta's setting in relation to the other provinces is shown by Table 2, which gives for 1941 the percentages of the

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[1] "Net" production represents the total value less the cost of materials, fuel, electricity purchased and process supplies consumed in the production process. For purposes of ordinary economic discussion, the net figure should be used in preference to the gross, in view of the large amount of duplication that the latter includes.

Table 1.--Gross and Net Values of Production in Alberta,[1] 1941.

Industry	Gross Production	Net Production	Net Production
	$	$	%
Agriculture	203,803,000	161,587,000	58.3
Forestry	9,330,156	6,474,131	2.3
Fisheries	440,444	440,444	0.2
Trapping	1,952,287	1,952,287	0.7
Mining	39,779,583	36,167,469	13.1
Electric Power	6,721,358	6,322,557	2.3
Construction	35,295,959	15,798,441	5.7
Custom & Repair	10,605,420	7,195,991	2.6
Manufactures	142,651,493	45,958,219	14.8
Duplications in Manufactures[2]	-7,403,842	-4,998,362	
	443,175,858	276,898,177	100.0

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[1] Canada Year Book 1943-44 pp. 192, 193, 194.

[2] The totals for manufactures involve duplicated amounts that were deducted in computing the total production. The duplication arises from including in two places a number on industries that may be regarded as extractive or as manufacturing processes, e.g., sawmills, butter and cheese factories.

Table 2.--Percentages of the Value of the Net Production in Each Industry to the Total Net Production, for Each of the Provinces[1] 1941.

Industry	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Yukon and N.W.T.	Canada
Agriculture	65.7	15.6	19.3	11.8	14.3	41.5	73.5	58.3	9.7	-	20.14
Forestry	3.9	9.6	31.2	12.5	4.7	2.9	2.0	2.3	26.0	.2	8.93
Fisheries	6.6	8.4	4.8	.2	.2	1.6	.2	.2	6.3	.1	1.10
Trapping	-	.1	.6	.1	.1	1.0	.9	.7	.5	32.4	.32
Mining	-	17.9	3.1	10.0	10.5	5.8	4.1	13.1	15.9	64.3	10.55
Electric Power	2.6	4.6	3.9	5.4	3.1	4.5	2.1	2.3	4.5	.8	3.88
Totals, Primary Production	78.8	56.2	62.9	40.0	32.9	57.3	82.8	76.9	62.9	97.8	44.92
Construction	6.4	10.2	8.2	6.0	5.2	5.2	4.2	5.7	6.8	-	5.71
Custom & Repair	6.5	3.6	3.3	2.8	2.7	3.9	2.9	2.6	3.4	-	2.87
Manufactures, n.e.s.	8.3	30.0	25.6	51.2	59.2	33.6	10.1	14.8	26.9	2.2	46.50
Totals, Secondary Production	21.2	43.8	37.1	60.0	67.1	42.7	17.2	23.1	37.1	2.2	55.08

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[1] Canada Year Book 1943-44 p. 194.

value of net production in each industry for each province. Apart from the Yukon and Northwest Territories, Alberta stands next to Saskatchewan and Prince Edward Island in the percentage of production attributable to the primary industries, the figures being 76.9 per cent, 82.8 per cent, and 78.8 per cent, respectively.

Ontario and Quebec are the two main industrial provinces of the Dominion, their secondary industries accounting for two-thirds in the case of Ontario and three-fifths in the case of Quebec, of their total net production. Due to the relatively large primary production of these two provinces compared to the others, the primary group is responsible for only 44.92 per cent of the total production of Canada.

The provinces of Nova Scotia, New Brunswick, Manitoba and British Columbia show a very similar pattern as between primary and secondary industries. In each instance the net production is roughly three-fifths from primary industries and two-fifths from secondary industries.

Although Alberta is in a more favorable position than either Saskatchewan or Prince Edward Island, if a closer balance as between primary and secondary industries is desirable, it may be seen that Alberta has considerable industrial development to undergo to reach a position comparable to that of Manitoba.

The degree of diversification found in each of the provinces is brought out by a further examination of Table 2. As was pointed out above Alberta has about three-quarters of her production concentrated in the primary industries.

Agriculture is the back-bone of Alberta's economy and in only two other provinces does this industry rank relatively higher, namely, Saskatchewan and Prince Edward Island.

Mining ranks second in importance in the primary group for Alberta. Excellent fields of high grade bituminous and lignite coal are found throughout the Province. Turner Valley, the oil center of Canada, is responsible for a substantial share of the mineral production of the Province in the form of petroleum and natural gas. While the bulk of petroleum production comes from this field, large quantities of natural gas are obtained from Medicine Hat, Viking and other areas. It may be seen that, while mining is relatively more important in Nova Scotia and British Columbia than in Alberta, it is relatively less important in Quebec and Ontario where it constitutes about one-tenth of the total net production in each case.

Forestry is relatively unimportant in Alberta, whereas, it is the first ranking industry in New Brunswick and first along with manufacturing in British Columbia.

Alberta's fishing industry, centered on the larger lakes in the central and northern parts of the Province, is as yet comparatively small. This industry reaches its greatest development on the Atlantic and Pacific Coasts of the Dominion, where two of the four great sea-fishing areas of the world are located.

Manufacturing is the leading secondary industry in all the provinces, as might be expected. Alberta leads Prince Edward Island and Saskatchewan in the percentage of net value attributable to this industry, but does not quite reach one-half the percentage of Manitoba, where one-third of all net production

comes from manufacturing.

The construction industry in Alberta compares favorably with the other provinces; Alberta leads Ontario, Manitoba and Saskatchewan relatively, and is only slightly under the percentages for Prince Edward Island, Quebec and British Columbia.

Briefly, it may be stated that Ontario and Quebec are essentially industrial provinces; Nova Scotia, New Brunswick, Manitoba and British Columbia show a good industrial development backing their basic primary industries. On the other hand, Alberta, Saskatchewan and Prince Edward Island are predominately devoted to the primary industries, mainly agriculture, and have varying degrees of secondary industry development.

Trends in Alberta Production.

During roughly the last twenty years the net value of production in Alberta rose in the 1920'3, fell in the 1930's and is now on the rise again. For the census years indicated in Table 3 it may be seen that 1926 represented the peak year of production (column one). A very sharp decline was registered in 1931 and this was followed by a further reduction in 1936. Although 1941 is shown slightly under 1926 in the first column, if the figures are adjusted for changing prices as shown by column 2, we find that 1941 was the year of the greatest net production. This 1941 figure represents a substantial increase over the average of the five years shown in the Table; the index numbers show a rise of 50 points in this respect.

Alberta's contribution to the Canadian total is shown as a percentage in column four, and on a per capita value basis

Table 3.--Value of Net Production in Alberta, Census Years[1]

Year	Net Production	Net Production Corrected for Changing prices[2]		Percentage of Canadian Total	Per Capita[3]	
		Amount	Index Numbers (1921=100)		Amount	Index Numbers (1921=100)
	$	$		%	$	
1921	154,376,861	154,376,861	100.0	5.48	262.34	100.0
1926	294,101,181	323,510,000	209.5	8.10	532.45	202.9
1931	164,947,717	251,650,000	163.1	6.60	343.98	131.1
1936	161,864,956	238,680,000	154.6	6.16	309.17	117.9
1941	276,898,177	338,430,000	219.2	5.87	425.08	162.0
Aver.	210,437,778	261,330,000	169.3	6.44	374.60	142.8

[1] Canada Year Books

[2] The figures in this column were corrected for varying price changes using the wholesale price index with the year 1921 as the base. It must be pointed out that the fall in prices during the depression years registered by this index did not equal the fall in prices of agricultural products. As agricultural products bulk large in the total production of Alberta, the figures tend to understate the actual volume of net production.

[3] The per capita net production was obtained by dividing the Alberta population into the adjusted net production figures.

in column five. Alberta's percentage of the Canadian total indicates that her relative output has declined from 1926 to 1941. This decline is no doubt explained by the impact of the depression during the 1930's on the prices of agricultural products which form such a large part of Alberta's total production. The still further decline as shown by the 1941 figure, may be largely due to the abnormally low crop yields of that year and to the extra impetus given to highly industrialized provinces by war contracts.

The increasing volume of net production from the Province is more clearly shown in the per capita columns. Although per capita production in 1941 was still under the peak year of 1926 (around 40 points by the index) a substantial gain has been recorded over the 1936 figure. War conditions causing shortages of labor, especially on farms, have no doubt been partly responsible for the higher output per person in 1941.

Although agricultural production is responsible for by far the largest share of Alberta's total production, its relative importance is showing a slight decline. Except for the depression year of 1931, the production of this industry in 1941 is the lowest in percentage of total output of any of the years shown in Table 4.1/ A low crop yield in 1941 may account for part of this decline.

Forestry shows a small gain in recent years in relative

1/No attempt has been made to adjust the percentages in Table 4 for changes in the level of prices for the years considered.

Table 4.--Percentage of Net Production in Alberta,[1] by Industries, Census Years.

	1921	1926	1931	1936	1941
	%	%	%	%	%
Agriculture	62.8	74.8	55.64	62.92	58.3
Forestry	1.8	1.4	3.25	2.01	2.3
Fisheries	0.2	0.2	0.09	0.19	0.2
Trapping	0.9	0.7	0.58	0.70	0.7
Mining	17.3	9.2	14.30	12.23	13.1
Electric Power	1.9	1.2	2.83	2.85	2.3
Construction	3.6	2.2	5.65	3.29	5.7
Custom & Repair	2.4	1.5	3.36	2.65	2.6
Manufactures	9.7	8.8	14.30	13.16	14.8
Totals	100.0	100.0	100.0	100.0	100.0

[1] Canada Year Books.

importance, while fishing and trapping have remained practically unchanged.

Mining production brings to light a rather wide variation. In 1921 this industry contributed 17.3 per cent of Alberta's total production, while in 1926 it was responsible for only 9.2 per cent. The figure for 1941 is about at the average of the years reviewed.

Electrical power reveals an increase in relative importance in 1941 when compared to the 1920's, but its relative position has not materially changed since 1931.

There is a decided upward trend to the percentage of total production resulting from the construction industry. The contribution in 1941 represents 5.7 per cent of the total, an increase of nearly 100 per cent over the twenty-year period. Large building committments by the Dominion Government for the Commonwealth Air Training Plan and for other military establishments in Alberta may account for the rather inflated figure for 1941.

Custom and repair shows only minor changes as would be expected from a service industry which is so closely related to the population needs.

Although the manufacturing industry is intimately related to agriculture, there is a decided trend toward an increase in its relative importance. From 1921 to 1941 the Table shows that manufacturing has increased its net production from 9.7 per cent of the total to 14.8 per cent, a gain of over 50 per cent.

During this interval the development of the Turner Valley oil field has led to the establishment of a petroleum refining

industry. Also the expansion of sugar beet production in the irrigated areas of Southern Alberta has made necessary the building of sugar refineries. These two new manufacturing industries, together with other new ones, have, along with the expansion of manufacturing establishments already producing, been largely responsible for this increase.

BREAKDOWN OF MAJOR INDUSTRIAL GROUPS

Alberta Production, 1941

Agriculture

Due to an abnormally low crop yield in 1941, the estimated gross value of agriculture production in Alberta for the year 1940 is presented in Table 5. The seven-year average for field crops was found to correspond closely to the 1940 production and for that reason the 1940 figures were chosen.

The growing of field crops is the principal occupation of the farming population of Alberta and in 1940 produced $136,572,000 gross or approximately 65 per cent of the total agricultural production. Wheat continues to be the main crop accounting for 65 per cent of the total field crops production. In the "other" group the main production comes from grain hay, hay and clover, sugar beets and root crops.

Livestock makes a very important contribution to the agricultural economy of the province. In 1940 this amounted to approximately one-third of the value of the field crops. Hogs, cattle and calves were mainly responsible for the showing made by this branch as they supplied roughly 90 per cent of the total.

The production of dairy products on Alberta farms has been increasing steadily. Table 5 reveals that in 1940 the total gross production was valued at $19,532,344. Of this total fluid milk and cream accounted for nearly one-half of the total. Creamery and dairy butter production made up practically all of the remaining portion, with cheese and ice cream showing relatively small amounts.

Table 5.--Estimated Gross Values of Agricultural Production[1] in Alberta, 1940

Item	Value	Percentage
	$	%
Field Crops		
Wheat	88,543,000	
Oats	20,600,000	
Barley	8,640,000	
Other	18,789,000	
Total	136,572,000	64.8
Live Stock		
Horses	1,269,000	
Cattle	15,499,000	
Calves	2,667,000	
Sheep & Lambs	1,273,000	
Hogs	24,426,000	
Total	45,134,000	21.4
Dairy Products		
Creamery Butter	6,648,000	
Dairy Butter	2,597,000	
Factory Cheese	386,000	
Dairy Cheese	28,000	
Ice Cream	720,000	
Milk & Cream	9,155,000	
Total	19,534,000	9.3
Poultry		
Eggs	3,979,000	
Meat	3,640,000	
Total	7,619,000	3.6
Other		
Honey	244,000	
Wool	640,000	
Fur Farms[2]	908,000	
Total	1,792,000	0.9
GRAND TOTAL	210,651,000	100.0

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[1] Annual Report of Alberta Department of Agriculture, 1942

[2] Canada Year Book 1943-44 p. 214.

The poultry group shows a very even division between egg and poultry meat production, the total representing 3.6 per cent of the total agricultural output.

Honey, wool, and fur farms comprise the other group and combined their production amounts to less than 1.0 per cent of the total.

Mining

The non-metallic minerals constitute the chief mineral resource of Alberta, as a reference to Table 6 shows. From the almost inexhaustible coal resources a gross production of $19,382,471 was realized in 1941. This was almost 50 per cent of the total mineral production. Petroleum and natural gas production together was nearly as large as coal, while salt was responsible for practically all of the remaining output of this group.

Cement and other clay products consisting of principally, sewer pipe, bricks and brick-tile, and pottery were produced to the value of $1,937,174. Most of the cement production comes from Exshaw on the C.P.R. west of Calgary, while the manufacture of clay products is largely centred around the city of Medicine Hat where natural gas is utilized in the manufacturing process.

Other structural materials found scattered throughout the province accounted for 1.5 per cent of the total mineral production.

Electrical Power

A total of 319,743,000 kilowatt hours of electrical energy was generated in Alberta in 1941. Of this total hydraulic

Table 6.--Mineral Production of Alberta,[1] 1941

Item	Value	Percentage
	$	%
Metallics		
Gold	8,277	
Silver	8	
Total	8,285	(2)
Non Metallics		
Coal	19,382,471	
Natural Gas	5,175,364	
Peat Moss	5,055	
Petroleum	13,985,906	
Salt	260,995	
Sodium Sulphate	32	
Total	38,809,823	93.8
Clay Products		
Cement	985,030	
Clay Products	952,144	
Total	1,937,174	4.7
Other Structural Materials		
Lime	151,296	
Sand & Gravel	433,504	
Stone	24,303	
Total	609,103	1.5
GRAND TOTAL	41,364,385	100.0

Percentage of Total Canadian Production 7.4

[1] Annual Report of Mineral Production of Canada, 1941, p. 21

(2)Less than one-tenth of one per cent.

stations generated 179,409,000 kilowatt hours and fuel stations generated 140,334,000 kilowatt hours.

Edmonton, with the largest fuel generation plant in the province, generates power from coal and operates its own distribution system. Medicine Hat uses power derived from natural gas and supplies her own requirements as well as those of the adjoining town of Redcliff. Lethbridge uses coal-generated power and has, like Edmonton a power exchange agreement with the Calgary Power Company (hydro-electric power) covering peak period needs. The Canadian Utilities Limited distributes power generated from coal from the City of Drumheller to towns north and northeast of that centre.

Hydro-electric development is confined to plants located west of Calgary on the Bow River and its tributaries. Installations rated at 71,997 h.p. were in use in 1941. Additional installations have been made since then and at the end of 1944 the horse-power rating had been increased to 92,920 in central electric stations and to 2077 in other industries.[1] This development represents less than one-quarter of the available power at ordinary minimum flow for 24 hours on sites where measurements or careful estimates have been made.[2] In other words, Alberta has not, as yet, developed one-fourth of her minimum water-power possibilities.

Based on the figures presented in Table 7 it may be seen that while hydraulic stations have only 46.39 per cent of the

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[1] Canada Year Book 1943-44 p. 328.
[2] Ibid p. 326.

Table 7.--Electrical Energy Generated and Installed Capacity (Primary Power) in Alberta;[1] 1941

	Kilowatt Hours Generated	Kilowatt Hours Generated	Installed Capacity (Primary Power)	Installed Capacity
	'000 kwh.	%	h.p.	%
Hydraulic Stations	179,409	56.15	68,180	46.39
Fuel Stations				
Steam	(2)		74,123	50.43
Diesel	(2)		4,677	3.18
All Fuel Stations	140,334	43.85	78,800	53.61
GRAND TOTAL	319,743	100.00	146,980	100.00
Percent of Canadian Total	0.96		1.80	

[1] Census of Industry, 1941, "Central Electric Stations in Canada" pp. 35, 39.
(2) Information not available.

total installed horse power capacity, they produced 56.15 per cent of the total electrical energy. It will also be noticed that as between steam and diesel plants, the diesel is relatively small having only 3.18 per cent of the total installed capacity. Diesel-engine plants are found principally in towns and villages where the demand for electrical power is small.

Manufacturing

Manufacturing, the second ranking industry in Alberta, is principally concerned with the processing of the natural resources of the province. The importance of the livestock industry is reflected in the position occupied by slaughtering and meat packing which from the point of view of the percentage of the total for all leading industries leads in capital invested, persons employed and net value of production, the figures for these three categories being equally high as presented in Table 8. Butter and cheese making, although much more decentralized, presents much the same picture as slaughtering and meat packing but on a reduced scale. Here also is found a pattern of near equality in regard to the percentage of total capital used, persons employed and net value of production. A quite different view is presented on examination of the petroleum products industry. With a relatively large capital investment representing 8.89 per cent of the total, it was responsible for 13.09 per cent of the total net value of production while employing only 3.32 per cent of the total persons employed in all leading industries.

Table 8.--Statistics of Leading Industries of Alberta,[1] 1941

Industry	Capital		Employees		Net Production		Value per Employee	
	Amount	P.C. of Total	No.	P.C. of Total	Amount	P.C. of Total	Capital	Net Production
	$	%		%	$	%	$	$
Slaughtering & Meat Packing	11,628,072	15.7	2,630	19.2	7,485,729	18.1	4,421	2,846
Petroleum products	6,574,472	8.9	455	3.3	5,427,893	13.1	14,450	11,929
Butter & cheese	4,972,705	6.7	1,198	8.7	3,056,206	7.4	4,151	2,758
Flour & feed mills	8,193,155	11.1	793	5.8	2,951,855	7.1	10,332	3,722
Sawmills	2,923,893	4.0	2,196	16.0	3,085,652	7.5	1,331	1,405
Bread & other bakery products	2,471,236	3.3	965	7.0	2,174,911	5.2	2,561	2,254
Railway rolling-stock	7,778,427	10.5	1,256	9.2	2,051,961	5.0	6,193	1,634
Breweries	4,538,006	6.1	274	2.0	1,773,262	4.3	16,562	6,472
Printing & publishing	3,000,277	4.1	838	6.1	2,363,697	5.7	3,580	2,821
Clothing, men's factory	1,224,835	1.7	514	3.7	968,385	2.3	2,383	1,884
Planing mills, sash & door factories	1,042,294	1.4	502	3.6	795,173	1.9	2,076	1,584
Aerated and mineral waters	827,782	1.1	222	1.6	843,008	2.0	3,729	3,797
Castings, iron	1,142,901	1.5	369	2.7	977,674	2.4	3,097	2,650
Printing & bookbinding	1,493,788	2.0	407	3.0	802,746	1.9	3,670	1,972
Fruit & vegetable preparations	372,359	.5	131	1.0	464,046	1.1	2,842	3,542
All other leading industries[2]	15,808,061	21.4	957	7.0	6,237,234	15.0	16,518	6,517
Totals, Leading Industries	73,992,263	100.0	13,707	100.0	41,459,432	100.0	5,398	3,025
Totals, All Industries	95,676,318		16,761		48,474,606		5,708	2,892

[1] Canada Year Book 1943-4. p. 416

[2] Other leading industries, individual statistics of which are not given because there are fewer than three establishments in each industry, are: malt mills, sugar refining, wood preservation, glass and cement products.

Flour and feed mills, breweries and the miscellaneous group, of which sugar refining is the principal one, show a high capital investment compared to the net value of the product while at the same time employing relatively few persons. In contrast to the above mentioned industries, bread and baking products, printing and publishing, men's factory clothing and planing mills and sash and door factories employ greater numbers of persons in relation to the amount of capital invested and to the net value of production. The manufacture of railway rolling stock ranks relatively high in the amount of capital invested and in the number of employees but is low in the net value of the product. The remaining industries listed in the Table are on the whole small and show a rather balanced pattern in regard to the points previously compared.

The last two columns in the Table attempts a comparison of the productivity of the different industries of the Province. The second last column represents the amount of capital required per employee for the leading industries of Alberta. The last column shows the productivity of the worker in terms of net production. It would appear that the most desirable type of industry for a comparatively new country such as Alberta would be one which had a high net value of product per employee while at the same time having a low capital investment per employee. This "ideal" industry would be especially beneficial from the standpoint of employment offered, in that additional capital invested would tend to increase the number of workers more than proportionately.

On a small scale the fruit and vegetable preparations industry comes closest to the "ideal" industry in Alberta. Table 8

reveals a low capital investment per employee with a moderately high net production per person employed for this industry. The manufacturing of petroleum products illustrates an industry where a large capital investment per employee is combined with a high degree of productivity per employee. This industry is naturally suited to large scale operations involving large capital sums but requiring a relatively small labor force. The amount of capital per employee as shown by the Table does not, however, take into consideration the costs of proving the oil area. The addition of such sums would in most cases materially increase the capital invested per employee figure. Another group of industries, of which sawmills is an example, show a low capital investment and a low net value per employee. In the case of sawmills, the mills in Alberta are usually small and make use of a relatively large amount of manual labor combined with a limited amount of machinery. Although employing large numbers relative to the capital invested, sawmills offer only seasonal work in the main. Industries with a high capital investment per employee but with only a moderate return per employee may be illustrated in the case of breweries and flour and feed mills. In both these industries, and especially so in the case of breweries, a large plant is required for economical production of the product. Both industries are capable of a fair degree of mechanization and this along with the large plant makes for a relatively high capital investment and for a relatively small number of employees.

Comparison with Other Provinces, 1941

Agriculture[1]

The leading branch of agricultural production in Canada in 1940[2] was the growing of field crops which accounted for over 50 per cent of the gross value of all farm produce.[3] Although this group was also the most important one in each of the provinces, it had a rather wide range of importance. For example, in Saskatchewan field crops were responsible for about 75 per cent of all agricultural production while in British Columbia they produced only one-third of the total. In Prince Edward Island, New Brunswick, Manitoba and Alberta, they contributed over 50 per cent of all agricultural products and slightly less than 50 per cent for Nova Scotia, Quebec and Ontario. The Alberta figure was roughly 65 per cent which put that province next to Saskatchewan in the importance of field crops in the agricultural economy.

Farm animals ranked second in Canada and second in all provinces with the exception of Nova Scotia and British Columbia where they were third and fifth respectively. Their relative importance was greatest in Ontario where approximately 27 per cent of agricultural production was due to the raising of farm animals, and least in New Brunswick, Saskatchewan and British Columbia, where they contributed about 13 per cent. Over one-fifth of

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[1] Canada Year Book 1943-44. p. 214.

[2] The year 1940 was chosen for agriculture production for reasons previously stated. See page 13.

[3] The gross value figures submitted make no distinction as between crops sold or those used as materials for other kinds of production such as feeding of livestock.

Alberta's agricultural production came from the raising of farm animals, principally hogs and cattle, placing Alberta next to Ontario in this important branch.

Milk production ranked third in Canadian totals for 1940 and it attained substantially the same position in all the provinces except Nova Scotia where it stood second. Its relative importance was greatest in Quebec, Nova Scotia, Ontario and British Columbia in that order, where the range was 16 per cent to 20 per cent of the total agricultural production. Its relative importance was least in Prince Edward Island, Alberta and Saskatchewan where production ranged from 6 per cent to 9 per cent of the total production. Alberta produced milk to the amount of roughly 7 per cent of her total agricultural production.

Listed fourth in importance for Canada was the production of poultry products. This position held for all the provinces with the exception of Nova Scotia where it ranked fifth, below fruit and vegetable production. About 13 per cent of British Columbia's agriculture production was due to poultry products with Ontario, Prince Edward Island, and New Brunswick each showing around 8 per cent attributable to this source. In Saskatchewan and Alberta poultry products were of least relative importance, the figures being roughly 4 per cent for the former and 3.5 per cent for the latter.

The production of fruit and vegetables came fifth on the list of Canada's agricultural crops. It also ranked fifth in

New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan and Alberta. In British Columbia, with its famed Okanagan and Kootenay fruit valleys, this was the second most important crop while it placed fourth in Nova Scotia. This group produced nearly 25 per cent of British Columbia's total agriculture products and roughly 13 per cent of Nova Scotia's, where production is centered in its well-known Annapolis valley. The aggregate gross value of fruit and vegetable production was highest in Ontario and next highest in Quebec but the proportion of the total production was only around 5 per cent to 6 per cent in each case. Alberta produced these products, principally vegetables, to the amount of not quite 2 per cent of the total agricultural production.

Tobacco growing held sixth position in Canada as a whole but its culture is confined to three provinces, namely, Ontario, Quebec and British Columbia. Of the total production, Ontario raised about 84 per cent, Quebec about 15 per cent and British Columbia slightly less than 1 per cent. This crop, however, constituted but 2.8 per cent of Ontario's total agriculture production and less than 1 per cent of Quebec's.

The remaining agricultural products were of varying importance in the different provinces. Fur farming ranked seventh in Ontario and Saskatchewan and stood eighth in Quebec. In Alberta the fur farms produced slightly less than $1,000,000 in 1940. However, for 1942 Alberta was the leading fur producer of Canada accounting for over one-fifth of the total Canadian production. Maple products were produced in Nova Scotia, New Brunswick, Quebec and Ontario, with over three-quarters of the total

coming from Quebec. Clover and grass seed is mainly cultivated in Ontario, Saskatchewan, Alberta, Manitoba, and British Columbia with the first three named responsible for the bulk of the crop. Ontario leads in the production of honey and wax with Saskatchewan, Quebec, Manitoba and Alberta following in that order. Wool production is centered in Ontario, Alberta and Quebec where 70 per cent of the crop is produced. Alberta's clip amounted to roughly 23 per cent of the Dominion's total.

A well-balanced farm economy has a stabilizing influence on farm income and is particularly to be desired in a country such as Canada where agriculture ranks as the second leading industry. As might be expected from the older more populous provinces, agriculture has attained a wider degree of diversification than is shown by the newer prairie provinces.

Quebec has the best-balanced farm economy of any of the provinces. Here field crops led with slightly over 40 per cent of the total, followed by farm animals with 22 per cent, milk production with about 20 per cent and maple products, fur farming and tobacco raising making up practically all of the remaining production.

The agricultural production of each of the Maritime provinces shows a somewhat similar pattern. Nova Scotia has a better balance than either of the other two provinces. Field crops produced a little over 40 per cent of the total, while milk production, farm animals, fruit and vegetables and poultry products accounted for over 50 per cent. Both in Prince Edward Island and New Brunswick field crops were responsible for well

over one-half of the total production, contributing 63 per cent and 56 per cent, respectively. Farm animals, milk products and poultry constituted the bulk of the remainder in the case of Prince Edward Island, while the above along with the fruit and vegetables made up nearly all New Brunswick's remaining production.

Ontario's agriculture is fairly well diversified with field crops contributing about 40 per cent of the total and farm animals bringing in nearly 30 per cent. Milk production realized about one-sixth of the total and poultry products about one-half of that amount. Fruit and vegetables and tobacco raising together were valued at around 10 per cent of total production.

Of the three prairie provinces, Manitoba showed the best balance, being less dependent on field crops than either Saskatchewan or Alberta. However, the production patterns of Manitoba and Alberta were very similar. The respective figures for the two provinces were: field crops 60 per cent, 65 per cent; farm animals 20 per cent, 21 per cent; milk 10 per cent, 9 per cent; with the remaining production very evenly balanced. Saskatchewan showed a very high percentage of agricultural production due to field crops (75 per cent). Farm animals produced 13 per cent, milk roughly 7 per cent, poultry products and fruit and vegetables nearly all the remainder.

British Columbia's agricultural production is comparatively small for so large a province. This is explained by the mountainous nature of the province as a whole and the large area covered by forests which results in a relatively small amount of land

suitable for agricultural purposes. In spite of the small production, it shows a good balance as between the different groups. Field crops make up about one-third of the production, fruit and vegetables around one-quarter, milk and poultry products about one-seventh each, and farm animals over one-ninth.

Mining[1]

Canadian mineral production in 1941 attained an all-time high of over $560,000,000 gross, an increase of over $30,000,000 compared with the previous year. Ontario has since 1907 been the leading mineral-producing province in the Dominion and in recent years has contributed approximately 50 per cent of the total. This was true of 1941 when Ontario's total mineral production was nearly $270,000,000 or about 48 per cent of the Canadian total. The metallics group, principally, gold, nickel and copper, was responsible for the larger part of the Ontario production. Gold, lead, zinc, copper and silver were the main minerals produced in British Columbia which ranked next to Ontario in this group. Quebec followed British Columbia in the extraction of metallic minerals with production of gold and copper being greatest. Manitoba and Saskatchewan came next in the order named, their contribution being mainly copper, gold and zinc. Alberta's production of metallics was negligible, amounting to a mere $8,285, in the form of gold.

The production of fuels in 1941 for all of Canada was valued at over $85,000,000 of which Alberta produced nearly

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[1] Mineral Production of Canada, 1941 pp. 6-11, Dominion Bureau of Statistics.

$39,000,000 or about 46 per cent, the highest of any of the provinces. Coal, crude petroleum and natural gas were the principal fuels making up Alberta's total. Nova Scotia was the second largest fuel producer, with coal as the sole fuel mined. Ontario, third on the fuel list, produced small quantities of natural gas and crude petroleum. It is interesting to note that for 12 million M cubic ft. of natural gas, Ontario received $2,000,000 more than did Alberta for 30 million M cubic feet. Apart from six and one-half millions of dollars worth of coal mined in British Columbia, the value of fuels produced by the remaining provinces was very small.

Quebec lead in the production of non-metallics, other than fuel, and in other industrial minerals. Of the Canadian total, Quebec was responsible for 70 per cent and of this amount, asbestos contributed about 90 per cent. Ontario with salt and quartz, Nova Scotia with gypsum and salt, and British Columbia with sulphur and peat moss followed in that order. Saskatchewan had a substantial production of sodium sulphate, while the Alberta total was made up almost exclusively of salt from Waterways in which the production was second only to Ontario.

Ontario and Quebec with two thirds of the Canadian total are predominant in the production of clay products. Bricks, structural tile and sewer pipes are their principal products. Alberta ranked next to the two leading provinces producing about 12 per cent of the Canadian total, mainly in the form of pottery, sewer pipes, bricks, and structural tile. British Columbia and Nova Scotia each produced a little better than one-half of Alberta's total; British Columbia specializing in fire-

brick and sewer pipes, while Nova Scotia concentrated on mainly sewer pipe, and brick.

Other structural materials, consisting of chiefly cement, lime, sand and gravel and stone, were produced in Ontario and Quebec to the extent of three-quarters of the Dominion's total. Alberta followed British Columbia and Manitoba in this group, being responsible for slightly over 4 per cent of the total. Alberta produced mostly cement, with sand and gravel and lime following in that order.

In comparing Alberta with the other provinces in total mineral production, it is clear that Alberta's 1941 position as fourth-ranking producer was due to her fuel resources which are the largest yet discovered in Canada.

Electric Power[1/]

The generation of electrical energy in Canada is largely centered in the central provinces of Quebec and Ontario where in 1941 over 80 per cent of all electrical power was produced. The leading position of Quebec in this field can be seen from the fact that 53.28 per cent of all electrical energy generated in 1941 was from this province. This production came from slightly under 50 per cent of the total installed equipment including auxiliary plants and was practically all hydro power. The reasons for this large hydro-electrical power production were mainly, the location of the pulp wood industry near the power sites and the export of power to nearby Ontario industries.

[1/] Central Electric Stations in Canada, 1941 Census of Industry.

Ontario ranking next to Quebec, produced 28.92 per cent of the total electrical energy for Canada with 27.86 per cent of the total power equipment. Here, as in Quebec, with no coal mined in the Province and the large power site at Niagara Falls near at hand, hydro-electric power generation seemed the solution to part of the fuel shortage. As a consequence practically all the power generated in Ontario is hydro. Alberta, on the other hand, with very large coal fields spread throughout the province and with a comparatively small industrial development, has not had the same necessity for the development of her water-power resources. Thus in 1941, Alberta produced only 0.96 per cent of the total electrical energy of the Dominion from 1.99 per cent of the total plant equipment. Only Prince Edward Island with 0.04 per cent and Saskatchewan with 0.59 per cent produced less electrical energy than Alberta.

Manufacturing[1]

Ontario and Quebec are by far the most important manufacturing provinces in Canada. Their combined production in 1941 amounted to $4,963,000,000 or over 81 per cent of the gross value of manufactured products of the Dominion. "The proximity of Ontario to the coal fields of Pennsylvania, the water power and other varied resources of the two provinces, and their nearness to the larger markets of Canada and the United States have all contributed to the above result."[2]

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[1] Canada Year Book 1943-44, pp. 408,9, 440.
[2] Ibid. p. 408.

The statistics show that in all industrial groups in 1941, with the exception of the textiles, where Quebec held the lead, Ontario lead in the value of gross production. In the wood and paper products group, British Columbia made a creditable showing but the production there only amounted to approximately 50 per cent of that of either Ontario or Quebec.

The animal products group was the most important in Alberta in respect of gross value of product and ranked second in the amount of capital invested and in the number of employees. For all of Canada, Alberta's animal products group ranked fourth in gross production, slightly under Manitoba, and fifth in the capital investment and in the number of employees.

The manufacture of vegetable products ranked second in Alberta for value of gross production, first in the capital invested and third in the number of employees. The Alberta industry stood fifth in Canada for gross production and capital investment and sixth in the numbers of employees. Again the Alberta position came only slightly under that of Manitoba except for the numbers of workers where Manitoba exceeded Alberta by about one-third.

Third ranking position in Alberta in the value of gross production and in capital invested was held by non-metallic mineral products. This group, made up chiefly of petroleum refining, was fifth, however, in the number of employees. The Alberta gross production was only slightly under that of Nova Scotia which followed the two leading producers, Ontario and Quebec. Alberta ranked fifth in the capital invested and third

in the number of workers.

For the remaining industrial groups, textiles and textile products, wood and paper products, iron and its products, non-ferrous metal products, chemicals and allied products, Alberta stood in seventh position in nearly every instance, ranking ahead of Prince Edward Island and Saskatchewan and below Nova Scotia, New Brunswick and Manitoba.

Manufacturing in Alberta tends to be carried on in relatively small establishments, there being only three plants in the province employing over 500 persons.[1] Quebec showed the highest degree of concentration in 1941 with nearly 44 per cent of all workers in establishments employing 500 or more persons. Alberta had a concentration of roughly 12 per cent, about one-half that of Manitoba.

Ontario, with a manufacturing production about equal to the remainder of Canada, had the most diversified group of manufactured products. Notable among the capital goods produced were automobiles, agricultural and other machinery, and electrical apparatus. Branch factories of many large United States industries have been located there, e.g., automobiles, vegetable food products, etc.

The manufactures of Quebec, the second leading industrial province, were more specialized than thoseof Ontario and manufacturing establishments on the whole were larger in size.

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[1] Canada Year Book 1943-4. p.411.

Among the leading industries were, pulp and paper, non-ferrous metal smelting, textiles, tobacco, and boots and shoes, all of which lend themselves well to large scale production.

The third ranking manufacturing province, British Columbia, had a widely diversified production based chiefly on her forests, fisheries, agricultural lands and mineral resources. The wood industries, including sawmilling, pulp and paper and planning mills, were outstanding here. Shipbuilding and repairs has greatly expanded since 1940 and in 1941 ranked as the second manufacturing industry. Fish-curing and packing, slaughtering and meat packing, petroleum refining and fruit and vegetable preparations all made important contributions to the industrial output of British Columbia.

Nova Scotia was the leading manufacturing province in the maritimes, and primary iron and steel, fish-curing and packing and shipbuilding and repairs were her principal industries. New Brunswick's manufactures were largely centred on the products of her extensive forests, pulp and paper and sawmilling being in the lead. Prince Edward Island processed principally agriculture and fishery products.

Of the three prairie provinces, Manitoba showed the highest degree of diversification in manufacturing. As a distributing centre for the West a number of allied manufacturing industries have grown up in support of its commercial activities. However, the manufacture of agriculture products predominated with slaughtering and meat packing and butter and cheese leading all industries in the gross value of production. Other

important industries were railway rolling stock, flour and feed mills, factory clothing and chemical products. Saskatchewan concentrated on the manufacture of agriculture products. Petroleum refining using Alberta crude oil has been a recent development. An automobile assembly plant and one for non-ferrous metal smelting helped somewhat in expanding the manufacturing total. Alberta, although not showing quite the same degree of diversification as Manitoba, manufactured a much wider range of products than did Saskatchewan. Besides having industries which are common to all three prairie provinces, such as slaughtering and meat packing, butter and cheese, flour and feed mills, and others whose products are consumed within small local areas, e.g., bread and bakery products, Alberta manufactured petroleum products, sugar beets, glass and clay products and fruit and vegetable preparations, most of which are not manufactured in the other two provinces.

Trends in Alberta Production

Agriculture

In setting out the trends of production in agriculture in Alberta during the last ten years we must keep in mind the fact that agricultural prices during the early thirties were badly depressed as a result of the slow down of all productive activity. The returns from agricultural products during this term of years were very low as compared to other branches of production where prices could be supported somewhat by curtailing output. Therefore, rather than tracing the value of production during

this period, a fairer method would indicate using the volume of production as a measure of comparison.

The total acreage under cultivation in Alberta has shown, with minor reductions in 1934 and 1935, a steady increase from 1930 to 1941.[1] There has been added in each of these years new land to the extent of about 300,000 acres per year. During this period a movement away from sub-marginal lands of the brown soil zone has been taking place. New lands coming under cultivation seem to be concentrated more in the older settled regions rather than in the fringe areas,[2] census divisions VI, I and X showing the largest increases.

Acres cropped to wheat, the principal field crop, have shown only minor variations during this period. The largest acreage sown to wheat was in 1940 when a good crop year yielded the largest wheat crop in the Province's history. Areas seeded to oats have remained fairly constant but barley acreage has been greatly expanded, a sharp rise starting in 1935 has doubled the cultivated area sown to this cereal. This spectacular increase can be traced to the decided concentration on hog production, particularly since the outbreak of the War. Rye production has shown no material changes, but since 1937 the area under flaxseed has increased, a big jump in the acreage showing in 1941 with another material rise coming in 1942, both due to increased demands for war purposes.

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[1] Figures used in tracing the trends of agricultural production are taken from: Agricultural Statistics of Alberta, Department of Agriculture, 1943.

[2] While the aggregate increase in acres appears to have been greater in established areas, the fringe areas show the larger relative increase.

Potato production has declined slightly due to a small reduction in the acreage in crop. There has been a steady increase in sugar beet growing, the area cultivated in 1930, 14,500 acres having risen to 27,600 acres in 1942. Other field crops showing material increases MOSTLY since the outbreak of war are; field peas from 1,300 acres in 1930 to 16,000 in 1942; beans, an increase of 2000 acres; mixed grains an increase of nearly five times the 1930 figure and alfalfa a rise of over five times the 1930 acreage.

The raising of livestock is a very important branch of agriculture in Alberta and the general trend seems to indicate that an increasing emphasis will be laid upon it. Apart from a gradual reduction in the horse population due to the introduction of power machinery, all other forms of livestock are on the increase. The cattle population was at its lowest point since 1915 in 1931 but a gradual increase occurred from then until 1935 when a decrease again set in lasting until 1939. Cattle marketings were comparatively low during the early depression years, but reached their highest point in the last twenty years in 1936. The marketings in 1940, 1941 and 1942 reveal minor gains over 1939. The production of hogs is closely related to the prevailing prices for an alternative use for certain coarse grain crops. This fact is reflected in the large upsurge in swine production in 1931 and 1932 when compared with 1930, an increase of over 100 per cent was recorded. During these years the prices of coarse grains were abnormally low and as a result the grain was marketed in the form of hogs. Except for 1936 hog production fell until

the first year of the war when a sharp rise came about. Since then, under the stimulus of rising prices and war demands, production has grown sensationally. Sheep production has shown only minor ups and downs since 1930 but the effect of doubling of the price of wool by a set Government price has been to bring about greater expansion in the raising of sheep (the numbers of sheep rose from 702,500 in 1941 to 828,000 in 1942).

The dairying industry has shown steady progress since 1930 with only one slight set-back in 1939. Creamery butter production effected a remarkable rise from 1930 to 1942, a period in which a gain of over 100 per cent was attained from virtually the same number of operating creameries. Factory cheese production presents an even more spectacular picture than that of creamery butter. In this interval an expansion in the number of cheese factories from 10 to 20 resulted in a four-fold increase in the cheese output. Ice cream output has risen from 542,000 gallons in 1939 to 930,000 gallons in 1942, an increase of over 70 per cent.

Egg production has been expanding since 1939 and in 1942 production was highest in the Province's history, although the numbers of laying hens were less than in all but one year of the 1920's. Scientific poultry farming resulting in a higher production per bird was responsible for the better showing of recent years. For the ten-year period ending in 1931 the average production per hen was 83.6 eggs per year while in the ten-year period ending in 1942 the average production was 101.8 eggs per year.

Shorn-wool production in Alberta reached an all-time high in 1942 when 442,800 sheep yielded 3,720,000 lbs. of wool. There has been an increase in the number of sheep shorn since 1939 although the 1942 figure is still under that of 1932 when 488,100 sheep were clipped. A tendency toward better yields per sheep is evidenced in the increase in the average weight per fleece. For the years 1933-37 the average weight was 7.6 lbs. per fleece while for the years 1938-1942 the average yield was 8.1 lbs. per fleece.

A remarkable growth has taken place in the apiary industry. The number of beekeepers has risen from 4,450 to 27,500. Production of honey and wax per hive varies greatly depending on weather conditions and therefore, the average production per hive shows considerable variation. The increase in total production is due to the additional hives brought into use.

Fur farming showed steady progress in Alberta up until 1937 when there were 587 farms in operation. The following two years saw a big increase, the number of farms rising to 822. With the outbreak of war prices declined and a number of marginal producers were forced out of business, but notwithstanding these circumstances, the Alberta industry showed small gains in 1940 and 1941.

Mining

The value of minerals produced in Alberta was $30,427,742 in 1930, declined to $19,702,953 in 1933, but since that year

has shown a steady increase reaching an all-time high of $47,359,811 in 1942. Due to the limitations imposed on the comparison of production of different years by means of value we shall again use the volume of production as a means of measurement.

Starting with the fuels which constitute the principal mineral group in Alberta, we find that that group as a whole has shown steady progress since the early thirties.

Coal, the most important mineral in the province, has risen from a low production of 4,564,015 tons in 1931 to 7,754,153 tons in 1942. Most of the increase has been registered since the outbreak of war, 1942 production being 40 per cent greater than that of 1939. An indication of the general trend of coal production in Alberta may be obtained from the Canadian indexes of volume of mineral production.[1] Using 1926 as 100, the 1931 output was 74.3, the 1936 production 92.4 and the 1942, 114.5. As Alberta produces a large share of the Dominion's coal these figures give a good view of the trends of Alberta production.

Although coal production has been increasing it came from fewer mines. From 1930 through to 1942 there has been a gradual reduction in the number of mines operating. While the number of large mines (over 200,000 tons production per year) have been increasing and the number of medium-sized mines (100,000-200,000 tons per year) have remained about constant, the small mines (under 1000 tons per year) have been decreasing in numbers since 1933. Employment in the coal mining industry

[1] Canada Year Book 1943-44. p. 295.

has fallen also; the number of workers dropped from 8,889 in 1930 to 8,040 in 1942. Mining efficiency has improved due to a greater concentration within the industry. The number of tons of coal mined per man underground in 1930 was 871 as against 1,322 in 1942.

Strip-mining, carried on to a limited extent prior to the war, has been encouraged by government assistance. This practice, although mining coal with a minimum of labor, must of necessity be confined to low grade coals found close to the surface. No extensive development of this method is to be expected because the coal is not of a nature suited to transportation any considerable distance.

Production of natural gas has been increasing since 1934; the 1942 volume was over 130 per cent greater than in 1934. During the 1930's repressuring of the depleted Bow Island field was carried on by using waste gas from Turner Valley and this field now serves as a reserve, along with the Foremost field, for use in case of interruption to service in the Calgary-Lethbridge pipeline. At Steveville, 100 miles east of Calgary, large gas flows were obtained from three wells drilled in 1939. This field is being further explored.

Farther north, the Viking field, which supplies Edmonton, has reserves of gas sufficient for some years to come. The Kinsella field, 10 miles east of the Viking area, has been out-lined by three wells. This field has not been drawn on but its reserves of gas, estimated to be much greater than those originally existing at Viking, form a reserve which will be

connected up to the Edmonton transmission lines before the Viking field is entirely depleted.[1]

Petroleum production in 1930 was 1,398,160 barrels of crude oil while in 1942 a production of 10,117,073 barrels was realized.[2] Turner Valley has shown steady progress and has been responsible for by far the greatest share of the oil produced. The number of producing wells in this field has increased from 180 in 1939, to 197 in 1942, while during the same period the number of wells in other fields increased from 21 to 30.

Production from oil fields outside of Turnery Valley has advanced rapidly during the last few years. Notable among the new producers are the Vermilion and Taber fields which were responsible for the bulk of the oil recovered outside of Turner Valley during 1942. An indication of the increase in the fields outside of Turnery Valley is shown by the rise in output from 78,300 barrels in 1941 to 139,335 barrels in 1942. In 1941 production was less than 1 per cent of Turner Valley's total while in 1942 the figure rose to 1.37 per cent. Although the difference between Turner Valley and the other fields is still considerable, it is significant that the other areas are beginning to close the gap.

In 1930, 2,067 tons of bituminous sands were processed. Since that date production rapidly fell off until it was sus-

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[1] The History of Alberta Oil pp. 41-2-3. The Department of Lands and Mines, Government of Alberta.
[2] Canada Year Books.

pended in 1936. Considerable development work has been carried on since 1936 and in 1941 production was resumed at the Abasand plant at McMurray. A fire in the winter of 1941-42 caused a delay but production was resumed by midsummer of 1942. From then until the end of November 11,156 tons of oil sands were mined from which 10,041 barrels of crude oil were recovered. Technical difficulties in the extraction process coupled with remoteness from consuming markets have tended to bring this resource along rather slowly. However, developments of recent years hold out the possibility of a rapid utilization of these oil-rich sands.

Starting in 1925 salt was produced on a commercial basis near McMurray from a well which had been originally drilled for oil. Transportation difficulties developed and after a period of three years' operation the plant was closed. In 1938 production of salt was resumed at Waterways where a plant was erected adjacent to the railway. From a production of 4,045 tons in 1938 the quantity of salt mined has risen rapidly until a record total of 22,360 tons was reached in 1942. The Waterways field is estimated at 500,000 tons to the acre and exploratory wells have proven a considerable area close to the railway. Expansion here will be limited only by the effective demand.

The production of clay products was very adversely affected by the economic depression for they are closely allied to the construction industry. Generally, production was relatively high in 1930 but dropped drastically until the low point was

reached in 1933. Since then recovery was gradual until 1940 following which time substantial increases were recorded due to the demands of construction for war purposes. A few comparative figures will show the general trend of production; common brick (soft mud process) 1930--7,298 M, 1935--3,087 M, 1940--3,275; common brick (dry press) 1930--10,886 M, 1935--4,806 M, 1940--7,292 M; hollow blocks, 1930--13,123 M, 1935--3,022 M, 1940--5,437 M; drain tile, 1930--48 M, 1935--52 M, 1940--269 M. It may be seen that from the few items listed that the 1940 figure has not in most cases reached the volume of production of 1930. The apparent slow recovery of brick making may be explained by the tendency to substitute reinforced concrete and concrete blocks for bricks. Glazed and unglazed pottery has increased sharply since 1939 when the value of production just passed the 1930 amount. The figures, unadjusted for changing price levels, are; 1930--$167,402; 1939-$180,017; 1942--$476,183.

Cement production in 1942 passed the previous high volume recorded in 1931. Lime has with minor dips shown progressive increases, production in 1942 being over 3 times that of 1930. Sand and gravel production has shown wide variations since 1930. An output of 1,626,989 tons in 1930 fell to a low of 281,122 tons in 1933 and then rose to a high of 1,722,465 tons in 1940. Production fell off greatly in 1942 when only 481,644 tons were produced.

Electric Power

The generation of electrical energy in Alberta has been increasing since 1931. This is to be expected for during this period population has increased and new industries using power have started up. However, an increase of over 100 per cent has been recorded in the production of electrical energy from 1931 to 1942. Although it is true that the Alberta domestic service consumption per customer has risen from 518 kw. hours per annum in 1931 to 657 kw. hrs in 1941 it is also apparent that the greater part of this increased consumption has resulted from uses other than domestic service. War conditions have made extra demands for electricity in Alberta as well as in other provinces and it may well be that a substantial part of this increased use of electricity is due to these circumstances.

The generation of hydro-electric power in Alberta goes back to a period prior to the beginning of this century but it was not until 1911 that the first large installation took place. In May of that year the Horseshoe Falls Plant on the Bow River, 55 miles west of Calgary was brought into operation with a capacity of 20,000 h.p. The following year the Kananaski Falls Plant, two miles west of the Horseshoe Falls Plant, with a capacity of 12,000 h.p. was completed and started operations. No more large installations were made until 1929 when the Ghost River Plant, 32 miles west of Calgary came into production with 2 units of 18,000 h.p. capacity each and with provision made in the intake works for an additional 18,000 h.p. unit.

The latest hydro-installation in Alberta was the Cascade Plant, near Anthracite, 5 miles east of Banff which began producing in 1942 with a single 23,000 h.p. unit. Water for this plant comes from Lake Minnewanka by way of a control dam and pumping station. There is a head of 340 feet of water at this plant.

Solid concrete gravity type dams were constructed at the Horseshoe Falls Plant and at the Kananaski Falls Plant when these two plants were built. The Ghost River Plant was provided with a storage reservoir of 2,866 acres capable of impounding 74,000 acre feet of water at the time of its construction. In 1933 a preliminary dam was constructed at the Upper Kananskis Lake which supplied 40,000 acre feet of storage. In 1942 the final dam was completed at this point which made available 96,000 acre feet of water for the low water period.

Other indications of the growth of hydro-electric power in Alberta are: (1) transmission line mileage increased from 150 miles in 1925 to 2,051 miles in 1945, (2) centres served in 1925 were Calgary, Cochrane and Morley while in 1945, 166 cities, towns and villages were connected to hydro-electric transmission lines.1/

The number of central electric stations in Alberta generating electricity from fuel increased from 51 stations in 1931 to 70 stations in 1942.2/

1/Information obtained through courtesy of Calgary Power Company.
2/Canada Year Books.

While there was an increase in the number of steam engines, steam turbines and internal combustion engines during this interval, from 83 in 1931 to 138 in 1942, the average size of the generating unit decreased from 709 h.p. to 571 h.p.

A total increase in main-plant equipment of fuel stations of only 19,977 h.p. occurred from 1931 to 1942 and of this increase the municipal power plant at Edmonton accounted for a large share by installing a new 15,000 h.p. steam turbine in 1937. Although this 1937 installation at Edmonton replaced in part obsolete equipment there was a net increase in the capacity of the plant. Even if no other large fuel using power units were put into operation during this period the above figures show that the average size of the new units installed was relatively small.

Generally speaking the trend of electrical power development in Alberta during the period reviewed was toward a greater utilization of hydro-electric power. Many places formerly generating their own power from fuel have changed over to the purchase of hydro-electrical energy for reasons of convenience and costs. Most of the new fuel stations opening up during this time have been of a size required to serve the needs of small local areas.

Manufacturing[1]

From 1930 to 1941 the number of manufacturing establish-

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[1] Statistics for this section are from Manufacturing Industries of the Prairie Provinces, 1942 Dominion Bureau of Statistics and Canada Year Books,

ments in Alberta rose from 774 to 1108, an increase of about 56 per cent. However, during the same span of years the total capital invested in manufacturing has shown only a moderate increase from $84,405,147 to $95,676,318 or about 13 per cent. The net value of production advanced from $40,692,898 in 1930 to $45,958,219 in 1941. A significant feature during this time was the relatively large increase in the cost of materials used in manufacturing in 1941 as compared with 1930. In 1942 the cost of materials was 64 per cent of the gross value of production while in 1930 they constituted only 55 per cent.

As has been pointed out previously the processing of agricultural products constitute the larger share of Alberta's manufacturing. Prices of agricultural commodities were generally higher in 1941 than in 1930 which may partly account for the higher cost of materials used in manufacturing in 1941 as compared to 1930. Notwithstanding the increase in prices, the figures seem to indicate a further swing toward those manufacturing industries which use agricultural products as the main raw material.

Power equipment installed in manufacturing establishments in Alberta in 1930 amounted to 23,849 h.p., made up of 21,434 h.p. in steam engines and turbines, 2,283 h.p. in internal combustion engines and 132 h.p. in hydraulic turbines and water wheels. For 1941 comparable figures were; 32,269 h.p. for steam engines and turbines; 13,987 h.p. for internal combustion engines and 12 h.p. for hydro, a total installation of 46,268 h.p. The very low hydraulic installations are explained by reason of the fact that practically all of Alberta's

hydro-electric power is generated in central electric stations. During the period under review the number of electric motors operated on purchased power or otherwise, rose from 45,407 in 1930 to 78,607 in 1940, a gain of 75 per cent. However, shifting from belts and shafting to individual motors at each machine does not necessarily indicate an increase in power used equivalent to the additional motors installed. The general shift to a greater use of power equipment is reflected in the noticeable growth recorded by it during these years. Total power equipment installed nearly doubled from 1930 to 1941.

There has been a very gradual increase in the number of workers during this period if the decrease due to the depression is disregarded. Total employment in manufacturing has risen about 25 per cent during this time; from 13,323 employees in 1930 to 16,861 in 1941. This growth is about what would be expected from a normal increase in the total population. An interesting fact is that during these years the number of wage earners has shown an advance of only 11 per cent. The reverse of this is true in regard to salaries and wages. Average salaries paid in 1930 were $1862- as against $1496- in 1941, while average wage payments rose from $1080 in 1930 to $1118- in 1941.[1/] The drop in the average salary paid may be in part the result of relatively larger numbers of women working in salaried positions in 1941 than in 1930 and receiving lower salaries on the whole than would be paid to men

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[1/] The 1930 average includes salaries and wages of employees of central electric stations, whereas, these are not in the 1941 averages.

working in similar positions.

Slaughtering and meat packing, the leading manufacturing industry in 1930, continued as the leader in 1941, having a gross production of over three times the next ranking manufacturing industry. The number of establishments advanced over 100 per cent (from 6 in 1930, to 13 in 1941), while at the same time the number of employees rose from 1,246 to 2,630. Petroleum products (gross $14,329,999) moved from third to second place and butter and cheese (gross $14,320,370) advanced from fourth to third place at the same time increasing the number of factories by 13. Sawmills jumped from tenth to fifth place on the basis of gross value of production. The number of sawmills rose from 96 to 250, employees from 1,447 to 2,196 but the capital investment from $2,849,762 to only $2,923,893.

Industries not listed among the leading industries of Alberta in 1930, but appearing in 1941, in order of importance based on gross value of production, were: clothing, men's factory; planing mills, sash and door factories; aerated and mineral waters; castings, iron; printing and bookbinding; fruit and vegetable preparations. Besides the above, other leading manufacturing plants in 1941 which have either come into being since 1930 or have increased production are: malt mills, sugar refineries, wood preservation plants, glass and cement factories.

Briefly, during the period under review the following features stand out:

(1) Manufacturing in Alberta has followed closely general economic conditions. The incidence of the depression resulted in greatly curtailed output but demands for war purposes and generally improved business activities have accelerated manufacturing production during recent years.

(2) Manufacturing establishments processing agricultural products, e.g. meat packing, butter and cheese, etc., have stepped up production greatly since the outbreak of war.

(3) Manufacturing industries based on forest products have also advanced to higher positions since 1930.

(4) Some new industries have been established and are making satisfactory progress.

(5) One large establishment, the nitrogen plant at Calgary, has been set up recently mainly based on the availability of cheap power and natural gas. This may be the forerunner of others who may locate in Alberta for similar and other reasons.

II. DISPOSAL OF ALBERTA PRODUCTION

Alberta's export and import trade is very difficult to measure because there are no man-made barriers to this trade movement. As the province is land-locked practically all commodity movements to and from it are by rail or by road. A relatively small amount of trade is carried on with the Northwest Territories by means of the Mackenzie River system and by air.

It must be pointed out that although practically all inter-provincial and international commodity movements to and from Alberta are handled by common carrier it is practically impossible to get accurate figures relating to this movement, particularly pertaining to the actual goods moved and the quantities of each. The Provincial Government is, through the Statistical Branch of the Department of Trade and Industry, making a noteworthy effort along this line but many necessary figures are only available on a voluntary basis from reporting businesses so that noticeable gaps still exist in presenting a full picture of Alberta's external trade. It is with this limiting factor in mind that the following discussion is presented.

Some measure of the volume of commodity trade can be had from the loadings and unloadings of freight carried by the railways. Since the early part of the present war inter-provincial trucking has been drastically curtailed and this would naturally mean that nearly all movement of goods in and

out of the Province would be by rail.

In 1941 there was 9,502,991 tons of freight loaded at Alberta points while in the same year 2,852,735 tons were unloaded.[1] This would indicate a much larger tonnage of goods moving out of the Province than is brought in. As to the value of the goods moving in and out of the Province, it might be noted that, in a general way, the exports consist of bulky commodities low in value, such as grains, livestock, coal, etc., while the imports[2] consist of manufactured goods, high in value in relation to weight.

Just what surpluses of commodities does Alberta have with which to trade for necessaries which she cannot produce herself, or does not as yet? As pointed out in an earlier part, Alberta is primarily a producer of goods related to the primary industries, principally agriculture and mining. It would be expected, therefore, that the products of these two industries would form the backbone of the Province's export trade.

AGRICULTURAL PRODUCTS

What is the picture in regard to wheat, the principal agricultural product raised and exported? The average annual production of wheat in Alberta for the years 1936 to 1942 was roughly 130 million bushels. The per capita consumption of wheat has been estimated to be about 4 bushels,[3] representing a con-

[1] Canada Year Book 1942 p. 519.

[2] Due to the large variety of goods imported into Alberta no discussion of them will be presented here.

[3] Canada Year Book 1942. p. 521

sumption of about 3.2 million bushels by Albertans. Seed requirements would be approximately 12 million bushels for the average acreage seeded. The amount of wheat consumed by livestock can only be roughly approximated but a generous allowance would probably not exceed 14 million bushels.[1/] The amount of wheat available for export after making the above deductions would be in the neighborhood of 100 million bushels.

The production of sugar from the sugar beet has made Alberta more or less self-sustaining in this very necessary commodity. Alberta produced in 1941 over 85 million pounds, assuming a per capita consumption of 100 pounds,[2/] this would leave about 5 million pounds available for export.

Alberta's annual potato production from farms averages around 2 million hundredweight. This figure, of course, does not take into account considerable quantities of potatoes raised in small garden plots. A per capita consumption of potatoes for 1941 of 201.4 lbs. would require around 1,600,000 cwt. while potatoes for seed would take nearly 400,000 cwt. No estimate of the amount of potatoes fed to stock is available but disregarding this factor it may be seen that Alberta produces about enough potatoes for her own needs.[3/]

[1/] This includes an allowance for poultry feed of one bushel of wheat per bird for the total poultry population of nearly ten millions. In 1942-43 the quantity of wheat fed to livestock and poultry was the highest on record amounting to 28 million bushel. Of the 1941 wheat crop about 19½ million bushels went to feed livestock.

[2/] Human consumption estimates used in this section are from the Canada Year Book and from Food Consumption Levels, 1944. King's Printer, Ottawa.

[3/] This estimate does not take into consideration sweet potatoes which are imported to the extent of roughly 4,800 cwt.

Alberta produces a large surplus of livestock, much of which is exported in the form of live animals and as meat and meat products. Computations based on 1941 figures[1] indicate that there was available for export from the Province 113 million pounds of dressed beef, or about three-quarters of the total production. Veal available for export after Provincial requirements were met would amount to about 4 million pounds dressed weight. About 84 per cent of the hogs produced in the Province are consumed elsewhere. This exportation amounted to the impressive total of about 240 millions of pounds dressed weight in 1941. Over one million pounds of dressed mutton and lamb were shipped outside of Alberta during the same year. About 10 thousand horses were marketed, the majority moving to outside points.

Creamery butter and ice cream are the main dairy products exported from Alberta. Total butter production for 1941 was approximately 50 million pounds, of which about 35 million pounds was creamery butter. Albertans consumed all the dairy butter and about 16 million pounds of the creamery butter, leaving available for export 19 million pounds of creamery butter. Alberta produced an estimated 3½ million pounds of factory and dairy cheese. Cheese consumption estimated at 4.3 pounds per person would require about the same amount as is produced. After supplying her own needs Alberta has about 50 thousand gallons of ice cream available for export, to adjacent parts of British Columbia and Saskatchewan.

[1] Production figures obtained from Department of Agriculture, Alberta.

Poultry production which has expanded greatly during the last few years is more than meeting the needs of the Province. Total production of chickens, turkies, geese, and ducks amounted to nearly 20 million pounds in 1941. Consumption at 20 pounds per capita would require about 16 million pounds for Alberta's population. This would leave available for export about 4 million pounds. Egg production also greatly exceeds the Provincial requirements. About 11 million of the 28 million dozen eggs produced in 1941 were marketed outside of the Province.

Although the production of wool in Alberta has been rapidly increasing it is not as yet sufficient to meet the needs of Alberta's population. In 1941 Alberta produced 3,282,000 pounds of wool and consumed 7,556,000 pounds based on a per capita consumption of 9.5 pounds.

Alberta produces generally a light colored, mild flavored honey with a low moisture content. In 1941 the production amounted to 3,120,000 lbs. Consumption based on 1.9 lbs. per capita,[1/] would require 1,512,700 lbs for Alberta. It would appear that there is a considerable quantity, about one half of the production, available for export.

MINERALS AND OTHER NATURAL RESOURCES

One of Alberta's principal natural resources is the widely distributed coal areas of high grade bituminous, semi-bituminous

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[1/] Food Consumption Levels. p.110. King's Printer, Ottawa.

and lignite coals. Apart from the coal fields of Nova Scotia, Alberta is the only province that has coal areas that are extensively mined. In fact, Alberta possesses about 87 per cent of Canada's known coal resources. Considerable quantities of Alberta coal are exported to the neighboring provinces and some find a market as far east as Manitoba and Ontario. There have been limited quantities exported to the neighboring states to the south. In 1941 the disposition of Alberta coal was as follows:[1]

	Tons
British Columbia	304,928
Alberta	1,335,606
Saskatchewan	1,052,913
Manitoba	430,663
Ontario	726,556
United States	32,742
Railways	2,598,340
Total -	6,481,748

Since the latter part of 1937 Alberta has changed over from an importer to an exporter of petroleum. Although some imports still enter the Province, exports far exceed imports. Oil is sent largely to the neighboring Province of Saskatchewan (179 million gallons in 1941) where two large refineries and a number of small ones serve that Province and parts of western Manitoba. Alberta oil in a refined form is still being shipped into the Northwest Territories even though oil production at Norman Wells has been greatly increased.

Large proven fields of natural gas, sufficient to meet the future needs of the Province for many years to come, produced

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1/Provincial Bureau of Statistics, Industries of Alberta, 1941 Department of Trade and Industry.

30,905,440 m. cu. ft. in 1941. Except for relatively small quantities exported to Montana from the Milk River Area, all the Alberta production is utilized within the Province mainly for heating purposes. It is also used as a raw material in the new nitrogen plant located on the outskirts of Calgary, from which considerable quantities of fertilizers are exported.

The products of Alberta's forests are in the main used within the Province. Considerable quantities of timber are utilized as pit props in coal mines, for telephone poles and for railway ties. Although able to meet her requirements of certain types of rough lumber and having a small surplus for export, Alberta still imports large quantities of lumber, principally from British Columbia.

Alberta leads the Dominion in the value of furs produced in 1942, production accounting for over one-fifth of the Canadian total. Some furs are processed and consumed within the Province but the larger part is exported as raw fur.

Commercial Fisheries are relatively small and are confined mainly to the larger lakes of the central and northern parts of the Province. The quality of the fish caught is excellent and considerable quantities are marketed outside of the Province, in fact, special markets have been developed as far away as New York and Chicago. Besides providing fresh fish for the local markets the fishing industry is important in supplying food for fur farms.

MANUFACTURED GOODS.

Alberta's export of manufactured goods are confined principally to processed food products, such as, meat, flour, sugar, creamery butter and canned vegetables. In addition to these commodities a number of others are disposed of in varying quantities outside of the Province. Expanded production of salt at Waterways has resulted in small quantities moving to Saskatchewan and British Columbia. Glass and pottery products from the Medicine Hat area were disposed of for a number of years as follows:[1]

Alberta	22.9%
Manitoba	14.8%
British Columbia	14.6%
Saskatchewan	11.6%
Elsewhere	36.1%
Total	100.0%

Large quantities of fertilizers from the Calgary plant are moving to outside points. Other goods exported in relatively small quantities include; men's and women's factory made clothing, lumber products (sash and doors, etc.), tents and awnings, and related textiles, etc.

[1] Provincial Bureau of Statistics, op. cit. p. 57.

III. EMPLOYMENT IN ALBERTA

This section deals with employment in Alberta by industrial groups based on the 1941 census releases of the Dominion Bureau of Statistics. For each of the three divisions made, i.e., all Alberta, the four largest cities and Alberta excluding the four largest cities, two tables are presented. The first table in each case gives the numbers of gainfully employed persons by industries and the second shows the percentages in each industry and in addition the proportion of men and women in each individual industry. Relative importance of the industrial groups for total employment, proportion of sexes employed and the importance of certain industries for female employment are discussed. Outside of the cities, employment is weighted heavily in favor of the primary industries and in order to give a better picture of the relationships of the other industries to one another the primary group has, in the main, been passed over.

EMPLOYMENT IN ALL ALBERTA

The number of gainfully employed persons in Alberta in 1941 was 308,168, consisting of 267,733 men and 40,435 women and constituting about 40 per cent of the total population.

The leading industry of the province, agriculture, as might be expected, provided employment for the most persons, there being 145,194 men and 2,435 women working at that occupation. This constituted 47.81 per cent of all employed persons. Trade, including the retail and wholesale branches,

had 21,535 or 9.30 per cent of the total employed. The service group ~~followed next with~~ had 16.36 per cent of all persons ~~so~~ employed. The position of this group is accounted for by the fact that 68.38 per cent of all women employed are employed in service industries. ~~This~~ Trade was the second ranking group for the employment of women and accounted for the slight advantage this industry had over manufacturing in total employment. Although manufacturing followed agriculture in providing employment for men it ranked only fourth in total employment for the reason given above, namely the concentration of women in the service and trade groups. Transportation and communications ranked next with 6.26 per cent of all persons so employed. Construction and mining provided employment for 7.20 per cent of Alberta's population, practically all of which were men.

Industries requiring muscular strength and endurance are naturally the ones in which men are employed to the near exclusion of women. Such industries are easily recognized by an inspection of Table 10 where, with the exception of manufacturing and agriculture, the first six listed show that less than 5 per cent of the total employed persons were women. While men are employed in all occupations, there are certain occupations which are well-suited to the special abilities of women. The Table reveals that the service group of industries was the one where female employment exceeds male, 54.86 per cent of all employees in this type of work being women. In two sub-classifications of this group, namely, professional and personal, the number of women employed were greater than the

Table 9.--Numbers of Gainfully Employed in Alberta, Industrial Groups, 1941[1]

	Male	Female	Total
	No.	No.	No.
All Industries	267,733	40,435	308,168
Agriculture	145,194	2,435	147,629
Forestry, Fishing & Trapping	4,392	20	4,422
Mining	10,746	53	10,799
Manufacturing	24,264	2,373	26,637
Construction	11,315	79	11,394
Transportation & Communication	18,384	907	19,291
Trade Total	23,087	5,583	28,270
Retail	16,889	4,646	21,535
Wholesale	6,198	937	7,135
Finance	3,167	1,179	4,346
Service Total	22,754	27,651	50,405
Professional	7,396	9,629	17,025
Public	7,102	1,651	8,755
Recreational	1,076	168	1,244
Business	486	162	648
Personal	6,694	16,039	22,733
Not Stated	4,430	145	4,575
Occupations Excluding Primary	107,401	37,917	145,318

[1] Dominion Bureau of Statistics, Eighth Census of Canada, 1941.

Table 10.--Percentages of Gainfully Employed in Alberta, Industrial Groups, 1941[1]

	Male % of Total	Female % of Total	Total % of Total	Percentage in each Industry	
				Male	Female
All Industries	100.00	100.00	100.00		
Agriculture	54.23	6.02	47.91	98.35	1.65
Forestry, Fishing & Trapping	1.64	.07	1.43	99.32	.68
Mining	4.01	.13	3.50	99.51	.49
Manufacturing	9.06	5.87	8.64	91.09	8.91
Construction	4.23	.20	3.70	99.31	.69
Transportation & Communication	6.87	2.24	6.26	95.30	4.70
Trade Total	8.62	13.81	9.30	80.53	19.47
Retail	6.31	11.49	6.99	78.43	21.57
Wholesale	2.31	2.32	2.32	86.87	13.13
Finance	1.18	2.92	1.41	72.87	27.13
Service Total	8.50	68.38	16.36	45.14	54.86
Professional	2.76	23.81	5.52	43.44	56.56
Public	2.65	4.09	2.84	81.12	18.88
Recreational	.40	.42	.40	86.50	13.50
Business	.18	.40	.21	75.00	25.00
Personal	2.50	39.66	7.38	29.45	70.55
Not Stated	1.65	.36	1.48	96.83	3.17
Occupations Excluding Primary	40.64	93.77	47.16	73.91	26.09

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[1] Dominion Bureau of Statistics, Eighth Census of Canada, 1941.

number of men (Table 9). The large female make-up of the professional group is explained by two professions, teaching and nursing, which in the case of teaching is largely composed of women and in the case of nursing is almost exclusively female.

Over 70 per cent of personal service was performed by women, domestic workers, beauty parlor operations, waitresses, etc., account~~ed~~ing for the larger part.

Nearly one-fifth of all employees in trade groups were women, the greater number being in retail trade. This industry, as was the case with finance, has turned to female help to replace workers who have joined the services or have taken over the more strenuous war jobs.

Manufacturing offers a rather limited sphere for women in Alberta due to the fact that the leading manufacturing industries are such that there are relatively few jobs that require only a small amount of physical exertion. Transportation and communications employed women in about 5 per cent of all jobs, and practically all as office staff, or as telephone and telegraph operators. Very few women work directly in agriculture as compared to men although over 6 per cent of all women employed were in this industry. The construction, fishing, and mining industries as was pointed out above, are largely restricted to men, there being only 162 women in all three industries in 1941.

EMPLOYMENT IN URBAN CENTRES

Nearly 30 per cent of all gainfully employed persons in the larger cities of Alberta in 1941, were in the service in-

dustries, with about equal numbers of men and women in this group as Table 12 reveals. The importance of the larger population centres in the distributive industries is shown by the fact that the trade groups were the second largest employers of labor (over one-fifth of all workers). Closely following was manufacturing which had 16,454 employees, slightly less than one-fifth of the total. The concentration of the manufacturing industries in these larger centres is brought out by the fact that of the 26,637 employees in all manufacturing industries, 16,454 were in the four large urban centres. The transportation and communications group was the next most important industry, taking 9,746 workers, or 11.34 per cent of all employed persons. Construction with 6,127 employees, the primary industries with 4,957, and finance with 3,240 made up together, about one-sixth of the total working force.

Edmonton had the largest force of gainfully employed persons in the province, there being nearly 40,000 in 1941. Meat packing plants, garment factories, wood-working factories, flour and feed mills, butter and cheese factories, two breweries, iron foundries and numerous other manufacturing establishments employ over 6,000 men and women.

As the seat of the provincial government, Edmonton has a large number of civil servant employees. The main line of the Canadian National Railways passes through Edmonton, a divisional point, where round-houses and repair shops engage many men.

Calgary, a divisional point on the Canadian Pacific Railway, also has railway repair shops and in addition does con-

siderable manufacturing of railway rolling stock at the Ogden Shops. Large flour mills, meat packing plants, breweries, petroleum refineries and a recently built ammonia plant, are a few of the large manufacturing industries. Calgary had 36,931 gainfully employed in 1941.

Medicine Hat, with a total 4,149 employed persons, specializes in flour milling, having the greatest milling capacity of any city in Alberta. Two firms are extensively engaged in the manufacture of various clay products, and a glass plant is located in nearby Redcliff. There is also in operation the only flax-crushing plant in Alberta.

Lethbridge, the southernmost city in the province, has among other industrial establishments, a brewery, a flour mill, a vegetable canning factory and an oil refinery. The total persons gainfully engaged in Lethbridge was 5,976 in 1941.

Larger cities offer more occupational opportunities for women than do the smaller centres and rural areas. Whereas in Alberta as a whole, about 13 per cent of all employed persons were women, the percentage drops to less than 10 per cent if urban centres over 5,000 are omitted. The female employment in the larger cities was nearly one-quarter of the total persons employed, e.g., Calgary 22 per cent and Edmonton 25 per cent. As was shown for the Province as a whole, the service industries accounted for largest group of women workers in urban centres; just about one-half, in this instance. In personal service 64.7 per cent of all employees were women while the professions had 57.5 per cent women. Finance followed service in the employment of women, the 916 women so employed represented 28.3 per

Table 11.--Numbers of Gainfully Employed in Alberta, Industrial Groups, Urban Centres 5,000 & Over[1]

	Male	Female	Total
	No.	No.	No.
Population, 14 Yrs. & Over	82,113	83,040	165,153
All Industries	65,801	20,143	85,944
Primary	4,839	120	4,959
Manufacturing	14,531	1,923	16,454
Construction	6,075	52	6,127
Transportation & Communication	9,249	497	9,746
Trade	13,983	4,244	18,227
Finance	2,324	916	3,240
Service Total	12,781	12,294	25,075
Professional	3,285	4,440	7,725
Public	4,940	1,188	6,128
Personal	3,498	6,400	9,898
Other	1,058	266	1,324
Not Stated	2,019	97	2,116

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[1] Dominion Bureau of Statistics, Eighth Census of Canada, 1941.

Table 12.--Percentages of Gainfully Employed in Alberta, Industrial Groups, Urban Centres 5,000 & Over[1]

	Male % of Total	Female % of Total	Total % of Total	Percentage in each Industry	
				Male	Female
Population, 14 Yrs. & Over	49.17	50.83	100.00		
All Industries	100.00	100.00	100.00	76.56	23.44
Primary	7.36	.60	5.77	97.58	2.42
Manufacturing	22.09	9.55	19.15	88.31	11.69
Construction	9.23	.26	7.13	99.15	.85
Transportation & Communication	14.06	2.47	11.34	94.90	5.10
Trade	21.25	21.07	21.22	76.72	23.28
Finance	3.53	4.55	3.77	71.73	28.27
Service Total	19.43	61.04	29.19	50.97	49.03
Professional	4.99	22.04	8.99	42.52	57.48
Public	7.51	5.90	7.13	80.61	19.39
Personal	5.32	31.78	11.52	35.34	64.66
Other	1.61	1.32	1.44	79.91	20.09
Not Stated	3.07	.48	2.46	95.42	4.58

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[1] Dominion Bureau of Statistics, Eighth Census of Canada, 1941.

cent of all workers. Trade, especially retail trade, is another occupational group in which relatively large numbers of women find employment. In this classification nearly one out of every four persons was a woman. About 2,000 women were working in manufacturing plants while in transportation and communication there were about 500 female workers. Very few city women find employment in the construction or primary industries.

EMPLOYMENT IN RURAL ALBERTA.

The primary industries predominate in the employment of persons outside of the larger urban centres. Table 14 shows that over 70 per cent of all persons were employed in this group. The service industries ranked next to the primary group. Trade, manufacturing and transportation and communications employed about equal number of persons, in each case less than 5 per cent of the total workers. Construction employees are relatively few in non-urban areas and there were only 1,106 persons employed in finance.

In 1941 over 75 per cent of all women employed in rural Alberta were found in the service industries. Out of a total female employment of 20,292, there were 15,357 women in this industry. The primary group, particularly agriculture, had 2,398 women employees representing about 12 per cent of all females employed. Wholesale and retail trade provided jobs for around 7 per cent of the total female labor force and ranked next to the primary group.

Table 13.--Numbers of Gainfully Employed in Alberta, Industrial Groups, Excluding Urban Centres 5,000 & Over[1]

	Male	Female	Total
	No.	No.	No.
All Industries	201,932	20,292	222,224
Primary	155,493	2,398	157,891
Manufacturing	9,733	450	10,183
Construction	5,240	27	5,267
Transportation & Communication	9,135	410	9,545
Trade	9,104	1,339	10,443
Finance	843	263	1,106
Service Total	9,973	15,357	25,330
Professional	4,111	5,189	9,300
Public	2,162	465	2,627
Personal	3,196	9,639	12,835
Other	405	64	568
Not Stated	2,411	48	2,459

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[1] Dominion Bureau of Statistics, Eighth Census of Canada, 1941.

Table 14.--Percentages of Gainfully Employed in Alberta, Industrial Groups,[1] Excluding Urban Centres 5,000 & Over

	Male % of Total	Female % of Total	Total % of Total	Percentage in each Industry	
				Male	Female
All Industries	100.00	100.00	100.00	90.87	9.13
Primary	77.00	11.82	71.05	98.48	1.52
Manufacturing	4.82	2.22	4.58	95.58	4.42
Construction	2.59	.13	2.37	99.49	.51
Transportation & Communication	4.52	2.02	4.30	95.70	4.30
Trade	4.51	6.60	4.70	87.18	12.82
Finance	.42	1.30	.50	76.22	23.78
Service Total	4.94	75.70	11.40	39.37	60.63
Professional	2.04	25.58	4.19	44.20	55.80
Public	1.07	2.29	1.27	82.30	17.70
Personal	1.58	47.51	5.78	24.90	75.10
Other	.25	.32	.26	88.73	11.27
Not Stated	1.19	.24	1.11	98.05	1.95

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[1] Dominion Bureau of Statistics, Eighth Census of Canada, 1941.

Manufacturing, transportation and communications, and finance combined engaged a little better than 5 per cent of all employed women. There were only 27 women in the construction industry in rural Alberta.

IV. LOCATION OF PRODUCTION AND RURAL POPULATION WITHIN ALBERTA.

NATURAL RESOURCES

Alberta's chief natural resource is her large area of fertile soil. Farm lands of varying productivity stretch from the international boundary in the south to roughly the 56th parallel of north latitude and from the foothills region of the Rocky Mountains to the border of Saskatchewan. Within this general area there are some regions of non-arable land to be found while outside of it most of the arable land lies along the Peace River as far as the Fort Vermilion area.

Moving north from the southern boundary of the province the following main types of farming are carried on; ranching, south and west of Lethbridge and continuing north in the foothills regions to a point generally west of Calgary, in the brown soil zone,[1] east of Calgary extending from Medicine Hat north to the 52nd parallel, and in the area west of Grande Prairie; grain farming, in many parts of the brown soil zone, and in the area between Lethbridge and Calgary; mixed farming, from Calgary north to Edmonton and continuing to Athabasca, from Edmonton east to the Saskatchewan boundary, and in the Peace River area; root crops (sugar beets, field peas and beans, etc.), in the irrigated areas surrounding Lethbridge and around Brooks (east of Calgary).

[1] See Plate III.

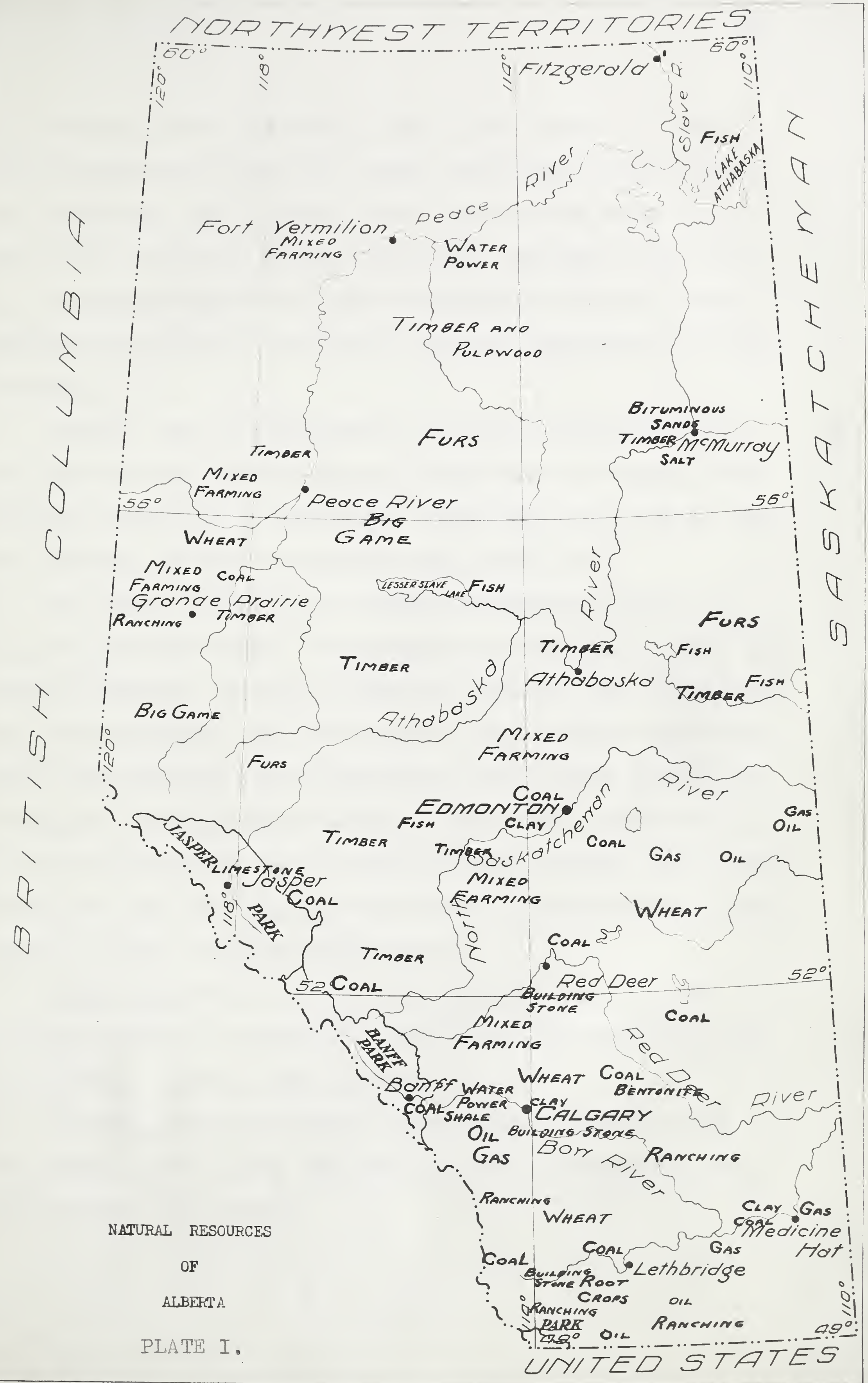
Forested parts range from the area west of Red Deer north to the region north and west of Edmonton. Lumbering operations are principally confined to the Rocky Mountains Forest Reserve. Timber areas in the northerly parts of the province are extensive but very little exploitation has taken place as yet.

Practically all the varities of big game animals native to Western Canada are found in the mountain sections of Alberta between the international boundary and the area south of Grande Prairie and also in the northern-most parts. Game birds are found throughout the province and fur-bearing animals are trapped in most of the regions north of Edmonton.

Whitefish and lake trout are found in commercial quantities in most of the larger northern lakes, Lesser Slave, Athabasca, Lac La Biche (east of the town of Athabasca), Cold (on the Saskatchewan boundary) and Wabamum (west of Edmonton) being the main ones.

Alberta is particularly rich in coal deposits. Coal is found in three distinct layers-- the Kootenay, the Belly River and the Edmonton formations. The highest grade and the hardest coals are found in the mountains, a lower grade in the foothills, and a lignite type on the plains.

Some districts mining coal in the Kootenay formation where the best coal is obtained, are: Crow's Nest Pass in the mountains east of Lethbridge; Canmore, near Banff; Nordegg, west of Red Deer; and Mountain Park, south-east of Jasper.



NATURAL RESOURCES

OF

ALBERTA

PLATE I.

In the Belly River formation, where lower grades of coal than the mountain coals are found, Lethbridge, Taber (east of Lethbridge) and Saunders Creek (west of Red Deer) are a few of the principal mining districts. Farther to the east in the plains region is found the Edmonton formation, where Drumheller, Edmonton and Pembina (west of Edmonton) are coal centres.

Natural gas is widespread. Principal producing fields are Medicine Hat, Turner Valley (south-west of Calgary) and Viking (south-east of Edmonton). Other gas areas may be seen by reference to the accompanying map (Plate I.).

In Turner Valley, the richest producing oil wells in Canada are to be found. Wainwright and Vermilion fields, both east of Edmonton, produce a fuel oil suitable for railway use and are developing into producers of considerable importance. There are numerous other small fields where only limited development has taken place as yet. These are located mostly in the southern and eastern parts of the province, e.g., Taber, Princess (east of Calgary), Red Coulee (Alberta-Montana boundary) and Dina (south of Lloydminster).

Large deposits of bituminous sands are found in the general vicinity of McMurray. From this same area comes all of Alberta's present salt production.

Building stone is found in many places reaching from Lethbridge north to Red Deer and also in the mountain areas around Banff and Jasper.

Deposits of limestone, shale, etc. are confined to the Rocky Mountain regions while clays are widely scattered, the main producing areas being around Medicine Hat, Calgary and Edmonton.

Some of the other minerals found in Alberta are: bentonite, Drumheller and near Jasper Park; copper, west of Calgary; alluvial gold on the banks and bars of many of the rivers; gypsum, north of Edmonton and north of Jasper; helium, from Bow Island gas; iridium, upper waters of Peace River; iron, nine miles east of Blairmore; ochre, seventy miles north of Edmonton and west of Banff; sodium sulphate, east of Edmonton at Birch Lake; talc, west of Banff.

Water power development at present is confined to the Bow River and its tributaries east of Banff. The principal rivers where the largest water power sites are available are the Slave, Athabasca and the Peace. These sites are, however, in rather remote areas of the province. Other rivers in the province have water power possibilities but in many cases dams for impounding water to provide reservoirs for storage would be required.

MANUFACTURING CENTRES

The manufacturing centres shown on the accompanying map (Plate II) are arranged in order of the value of net production for 1942. The size of the black dots are representative in a general way of the net production of each place although they are not proportional to it. It must be pointed out that certain relatively large centres in the province are not shown

for two main reasons. In the first case, unless the town or village had three or more establishments it was not listed in the government publication.[1] This provision eliminated places such as, Raymond and Picture Butte (sugar refineries) and Exshaw (cement) etc. In the second case, a centre may have had a relatively large value of gross production but when the net production was found the amount was less than $50,000, below which figure no places are mapped. For this reason, towns like Barrhead, Didsbury, St. Paul and others, do not appear.

The predominating positions in manufacturing held by Calgary and Edmonton are quite apparent from a casual inspection of our map. It may also be seen that Medicine Hat and Lethbridge showed up fairly well but the other points on the whole carried on very little manufacturing. Some of the leading manufacturing industries of the larger cities have already been set out.[2] The establishments in the smaller centres are mainly producing for local consumption from raw materials close at hand. A few representative types of manufacturing found in these places are; flour milling, butter and cheese, sawmills, planing and sash and door factories, bread and bakery products, etc.

AGRICULTURE

Present Location of Rural Population

Plate III indicates graphically the distribution by soil

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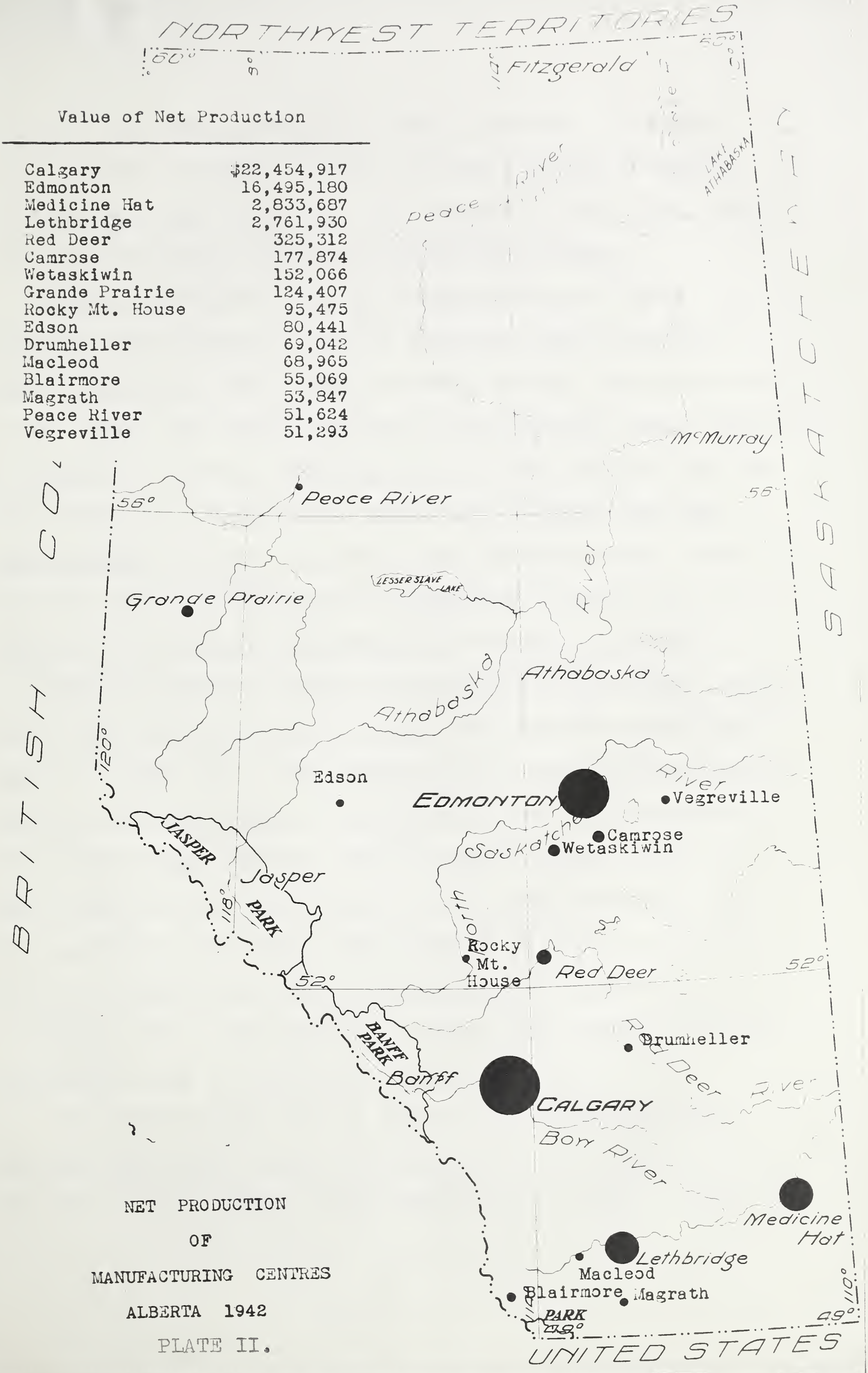
[1] Manufacturing Industries of the Prairie Provinces, 1942 p. 36. Census of Industry, Dominion Bureau of Statistics.

[2] See above p. 65.

Value of Net Production

Calgary	$22,454,917
Edmonton	16,495,180
Medicine Hat	2,833,687
Lethbridge	2,761,930
Red Deer	325,312
Camrose	177,874
Wetaskiwin	152,066
Grande Prairie	124,407
Rocky Mt. House	95,475
Edson	80,441
Drumheller	69,042
Macleod	68,965
Blairmore	55,069
Magrath	53,847
Peace River	51,624
Vegreville	51,293



NET PRODUCTION

OF

MANUFACTURING CENTRES

ALBERTA 1942

PLATE II.

zones of the rural population density in 1941. In Table 15, a further analysis is made, in that population density 1941, is not only related to soil zones but also to the long-time average yields occurring within these zones.

Before proceeding with an interpretation of Plate III and Table 15 it might be well to indicate what is mean by rural population. The Dominion Census defines rural population, as all people who reside outside of incorporated towns, villages or hamlets. Strictly speaking Plate III and Table 15 are not indicative of a purely rural population, because some unincorporated villages and hamlets are included in the count. However, these unincorporated villages and hamlets are few in number, and the picture presented is reasonably accurate.

Soil may affect density of population in two ways; that is, by soil texture and soil zone. Soil texture varies from sands to clays, and in many parts of the province where moisture is a limiting factor, the texture of the soil determines its productivity. Such an area is Acadia Valley, which is a clay pocket located in an area of low productivity but which is reasonably productive. This quality of soil texture as related to productivity influences density of population in localized areas. Data however, have not been gathered on this particular phase of rural population density.

In Alberta there are six broad soil zones, commencing from the south-east corner of the Province and moving north and west, namely, brown, dark brown, shallow black, black,

transition and grey. Rainfall increases in a north and westerly direction and thus has caused each soil zone to be more fertile until the black soils are reached. The grey wooded soils, however, are less fertile again, not because of lack of precipitation, but because of leaching which has not permitted these soils to build up plant foods such as organic matter and nitrogen.

Reference to Plate III indicates that the brown soil zone is one of relatively sparse population. Possibly one--third of the entire zone supports a population of less than 50 persons per township and well over three-quarters of it has less than 100 persons per township or 3 persons per section of land. It is true, of course, that ranching and extensive wheat farming are conducted in this zone because of relatively scanty rainfall which has resulted in low and variable productivity of the land. This type of agriculture means a low density of population. The apparent contradicition to the light concentration of population within this zone as shown by Municipal District 66 is explained by the fact that the greater part of this district is within an irrigated area, where the land is capable of supporting a dense farm population. The relatively greater yields per acre of this district accounts for in part, the larger population per township in the brown soil zone than in the dark brown when the average yield is 15-17.9 bus. per acre (Table 15). However, in this instance the 171 persons per township in the brown zone is the average of only 3 municipalities, one of which is M.D. 66 with an average

ALBERTA

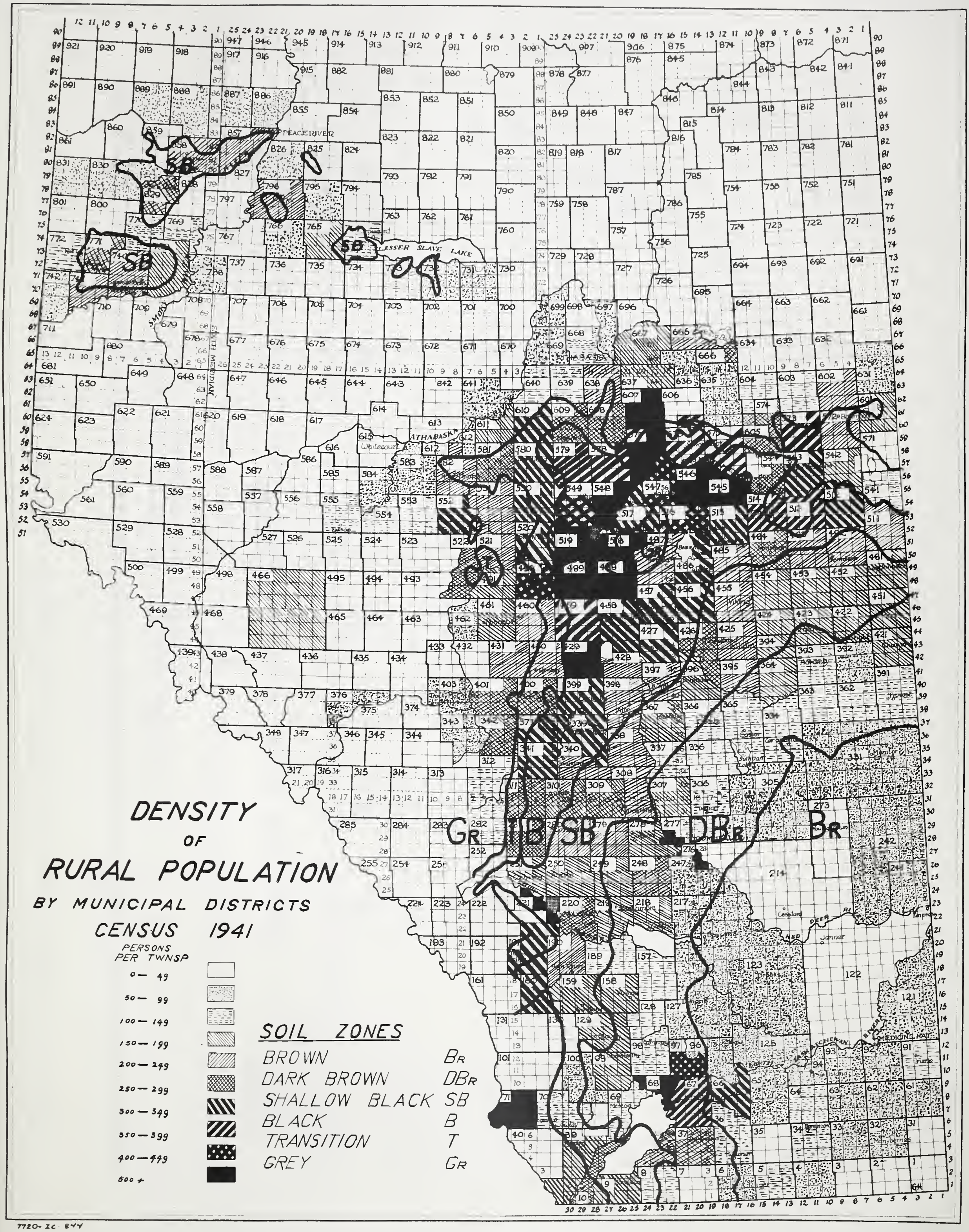


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PLATE III.

Table 15.--Relation between Soil and Density of Rural Population, Alberta, 1941

Average Yield (bu. per acre)	Average Density of Rural Population (persons per township)					
	SOIL ZONE					
	Brown	Dark Brown	Shallow Black	Black	Transition	Grey Wooded
	No.	No.	No.	No.	No.	No.
Less than 12	69.5					
12 - 14.9	83.2	114.9	156.7 (2)			
15 - 17.9	171.0 (1)	153.8	184.9	247.6	184.8 (3)	209.6 (2)
18 - 20.9		270.2	263.4	307.6	251.2	222.5 (1)
Over 21			230.5 (2)	403.8	300.6	297.6
All	92.5	169.7	216.7	342.0	275.2	256.4

(1) Includes 3 Municipal Districts only.
(2) Includes 2 Municipal Districts only.
(3) Includes 1 Municipal District only.

(~~of only 3 municipalities, one of which is M.D. 66 with an average~~) of from 250-300 persons per township. It must be remembered that this zone contains most of the land administered under the Special Areas Act of 1938. Land coming under this Act is mostly sub-marginal and can support very few persons under ordinary methods of agriculture. It would appear then that for this zone as a whole some relationship exists between the productivity of the soil and the density of the population.

Proceeding from the brown soil zone north and west on our Plate we may see clearly that the progressively better soils of the dark brown, shallow black and black soil zones are supporting increasingly larger populations. In the black zone there are no districts which average less than 200 persons per township and in the greater part of it the average is 300 persons or more. The increasing density of settlement of the area from M.D. 341 north to M.D. 607 and from M.D. 520 to roughly the eastern boundary of the province may be due in part to a change in the type of farming, mixed farming replacing the growing of grain crops which predominates in the shallow black and dark brown zones. This area also has a high concentration of farms where dairying is carried on more or less intensively. This type of farming demands a relatively larger labor force than grain farming. Within this same zone are to be found many settlements populated by families of French, German and Russian origin who usually have larger families than do persons of Anglo-Saxon stock.

The fringe areas, made up of the transition and grey-

wooded soil zones, have a relatively dense population but here settlement is limited somewhat by the necessity of clearing the land of trees. The population of the Peace River area as a whole is somewhat sparser than the southern regions of the province which were settled first. However, there are districts with good black soil in the Peace River region where agricultural advancement and density of population would equal that found in the black soil zone south of Edmonton.

It would be expected that the grey-wooded soil zone as such would in the future if fully settled, support a population approximately as dense as that now inhabiting the black soil zone. That is, the typical size of farm is likely to be the half section unit and the relatively low productivity of the soil will be dealt with by cultural means rather than by extending the size of the farm unit.

Changes in Rural Population

Since the beginning of civilization populations have been shifting throughout the world because of economic conditions and for various other reasons. This is none the less true of Alberta between the period 1931 and 1941.

The first contributing factor to a shift in the density of population may be caused by immigration from other provinces of Canada or from other countries. The population within the province may also shift because conditions may seem more favorable in one area than in another. Lack of rainfall created an exodus of people from the south-eastern part of the province from 1931 to 1941.

ALBERTA

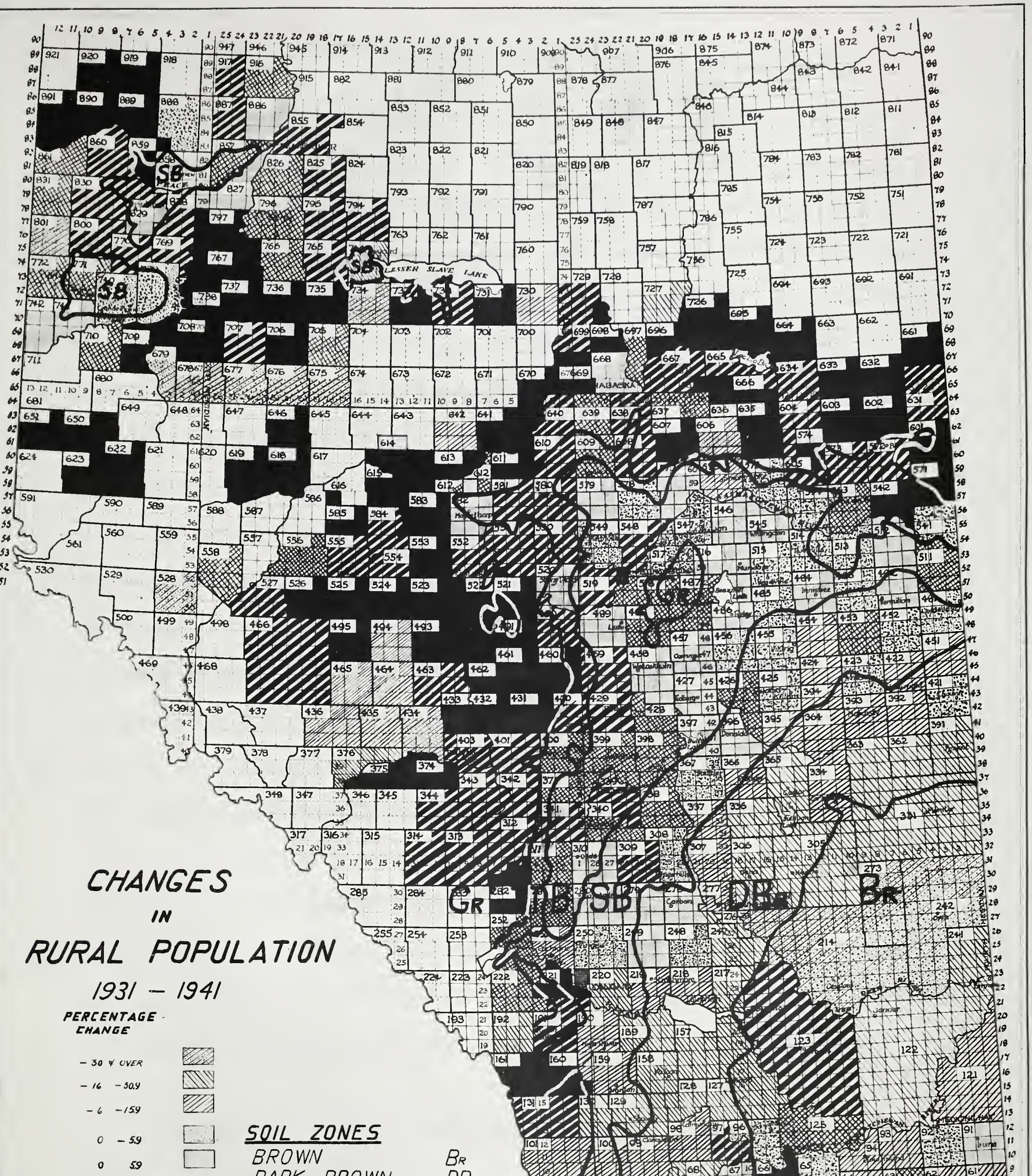

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PLATE IV.

Trends in rural populations may also be affected by size of families increasing in any particular area. This in turn may lead to smaller farms.

A change in type of farming in any area may in one instance cause an increase in the rural population for such a change may necessitate the hiring of more labor. On the other hand, greater mechanization may decrease the population by dispensing with hired help and by increasing the size of farm.

In Plate IV shifts in the density of Alberta's rural population is expressed on a percentage basis. Generally it will be noted that the population in the brown and the dark brown soil zones has decreased as between 1931 and 1941. This decrease resulted from drought conditions and low prices which convinced many farmers that the area was over-populated with respect to its productive capacity. However, within this area L.I.D. 123 has shown an increase in population density of 35 per cent. L.I.D. 123 (which contained the former C.P.R. irrigation district and which was turned over to the resident farmers in 1935 under the name of the Eastern Irrigation District), has had an increase in population due to an expansion of irrigated acreage. Farmers from both the drought areas of Saskatchewan and Alberta were encouraged to move into this area.

The shallow black and the black soil zones show less productive variability than the previous two zones just discussed and consequently support a reasonably stable population.

Where rural population increases have taken place within the former two zones it is believed they may have resulted from; (1) increases in size of farm family, (2) decreases in size of farm, and (3) changes in the type of agriculture practiced resulting in the necessity of hiring more labor.

Rural population in the transition and grey wooded soil zones have shown marked increases between 1931 and 1941. This has resulted from the scarcity of suitable agricultural land elsewhere and the availability on the fringes of free or very cheap land. During the depression period drought-ridden farmers and unemployed from the cities moved to these fringe areas in an effort to gain independence. In some cases also, sons of established farmers in the black soil zone sought farms in the fringe areas because of the lack of available lands near their homes.

In reference to the changes of rural population on Plate IV it should be realized that these changes are on a percentage basis, that is, in a well-settled area a small increase is indicated by a small percentage change; in a sparsely populated area a similar increase is noted by a large percentage change. In the transition and grey wooded fringe regions the percentage change has been high but the aggregate increases have in most cases been small.

V. FACTORS AFFECTING LOCATION OF INDUSTRY

AVAILABILITY OF RAW MATERIALS

Alberta's manufacturing development has been largely built up on her abundant natural resources. The leading industries of the Province are those whose main source of raw material has been the produce of the farm, the forest and the mine. Agricultural production which overshadows that of all other industries is responsible for the high ranking positions held by the slaughtering and meat packing, the flour mills and the butter and cheese factories, as well as contributing substantially to such industries, as bread and bakery products and fruit and vegetable preparations. Even the brewing industry depends on high grade Alberta barley for its principal raw material. Petroleum refining, another leading industry, relies on the crude oil obtained from Turner Valley and other producing fields within the Province.

Alberta's forests, it is claimed, rank next to her fertile soil and provide the raw material for her sawmills, planing mills and sash and door factories, etc.

That a limited amount of exploitation of the natural resources of Alberta has taken place will not be denied, but it seems pertinent here to inquire if the exploitation has reached its economic limitations. A casual inspection will reveal that there are certain raw materials in Alberta which are, as yet, not fully developed. The extensive proven coal reserves are ample evidence of this fact. What are the reasons

for this rather limited development?

Natural resources differ immensely in quality. Some of these differences are from the economic point of view immaterial, e.g., that land in most places is level and firm enough for buildings, while other differences are very relevant from the point of view of various industrial activities. Alberta coal, for instance, varies greatly in quality ranging from a hard semi-anthracite to a low grade soft brown prairie lignite. Clearly, everything else being equal, the good coal will be mined and the poor coal passed up. Again, in case of the forest areas the better quality trees are cut and the poorer ones left standing. Thus, it is quite evident that one important limiting factor in the development of the natural resources is the quality of the product.

Accessibility of the resource is another very important factor in determining whether or not continued development in the industry will take place. Resources in accessible places are usually worked first, the more inaccessible the resource area, the more distant the time when it will be opened up. Again referring to the coal resources of Alberta we are reminded of the vast reserves which are yet untapped in the more or less inaccessible reaches of the eastern slopes of the Rocky Mountains.

The costs of extraction also play an important part in deciding the limit to which development will take place. Mines become worked out and continued production can only be possible at increasing costs per unit recovered. Continued cropping of the agricultural lands uses up the natural soil constituents and

the productivity of the land can only be retained by adding in the form of fertilizers, etc., that which has been removed. If these extraction costs continue to increase more inaccessible resources and those of poorer quality will come within the range of economic development.

The effect of the market for the resources has an important bearing on the degree of the development. A large home market or one reached by good transport relations will naturally create a demand for these products which can be met only by expanding the degree of their exploitation. If, on the other hand, the local market is small or the transfer relations are relatively poor, a definite limitation is placed on the continued expansion of that resource.

If a progressive development of the abundant natural resources of Alberta is to take place, it would appear that certain changes in these limiting factors and in other things will have to take place. Obviously an increase in population or cheaper transportation facilities would aid materially in bringing about further developments. Introduction of new and more economical techniques could materially reduce the cost of extraction. Opening up of new areas by improvement in roads, etc., could conceivably bring into production resources of a higher quality than are now in use.

The possibilities regarding certain raw materials of which Alberta has plenty of supplies, are manifold. Some of these raw materials have had limited uses up to the present and some are as yet undeveloped. Bituminous tar sands, located on the Athabasca and Clearwater Rivers, come to mind when we think of un-

developed resources. Here is found one of the largest deposits of asphaltic material known. They are estimated to be at least 10,000 square miles in area, with a possibility of still greater deposits. Some of the sand has been used experimentally and successfully too, for surfacing highways and at present pilot plants are producing gasoline, tractor and diesel fuels as well as asphalt. Other by-products from the manufacturing process are possible, such as, roofing materials, paint, etc. This development is still in the experimental stages and no doubt the necessary technique of extraction and manufacturing will make it economically possible to distribute these products to the great Prairie markets which await them.

Reference might be made to the future possibilities in the utilization of coal. Numerous by-products are possible from the processing of the large bitumnious beds of coal found in Alberta, of which oils, perfumes, aspirin, acids, dyes, and gasoline are but a few. Hydrogenation of coal, developed on a large scale in certain countries of the world, offers interesting possibilities for new industries in Alberta. Although the process has been considered impracticable from a cost basis compared to the recoveries from oil, continued depletion of world oil resources along with improved technological methods could bring about the establishment of such industries in Alberta.

Other raw materials at present being only partly used or being discarded as waste suggest potential future industries. Until only recently natural gas was wasted in terrific quantities, but now is being used not only for heating but as a raw material

for the manufacture of nitrogen fertilizers. Consider also the waste of straw from our agricultural crops. Paper and paper products of certain kinds, can be made from straw. Linen cloth has been made experimentally from the short fibres of the seed flax plant and there are numerous other uses to which many other agricultural wastes might be put. Whether Alberta can economically use these wastes has yet to be proven.

Let us consider why certain raw materials produced in Alberta are shipped out as such and are not manufactured or are manufactured on a very small scale within the Province. A few such raw materials are, wheat and coarse grains, flax, hides, wool, furs and timber.

It may be said that regions, like individuals, reap certain advantages from specialization regardless of the difference of productive equipment. This specialization makes it possible to produce on a large scale; and will enable full individual division of labor and the use of the most efficient size of plant. Certain commodities can be produced very cheaply in large factories and when spread over large markets reach great numbers of consumers. Other commodities however, may be produced in small establishments just as efficiently as in large ones and they tend to be produced near the market.

If certain productive factors -- raw materials, tools and machinery -- are completely divisable, then any combination of them would be possible regardless of their absolute quantities. It would be possible then to establish any size of plant which would produce at the lowest cost per unit or commodity. How-

ever, the size of the plant is important, for in many cases only a large-size establishment can combine the productive factors to give the most economical scale of production.

Not only the scale of production but also the cost factors must be considered in deciding whether Alberta's raw materials may be processed within her boundaries. The cost of power, the wages that must be paid different grades of workers, the interest rates demanded for the use of capital and the local taxes are all important considerations. A comparison with other areas might reveal that costs in Alberta are lower than in these other areas. But does this necessarily mean that the manufacturing should take place in Alberta? The answer I think, is no, for it might be more advantageous to devote additional productive factors to those goods in which Alberta has special advantages than to others which, although capable of being made at lower cost in Alberta, offer less in total gain. This may account for, say, the shipment of wool from Alberta in the raw state and the importation of manufactured woollens. For clearly, it would be to the advantage of the Province to devote additional factors to the production of, for instance, flour mills, rather than to wool manufacture, if the net gain is higher in the former case.

FACTORS AFFECTING COSTS

There are a number of factors which constitute the main costs of producing a manufactured article. Some of the most important ones are, laid-down costs of the raw material or materials, cost of labor of all grades, cost of power, interest

payments for the use of capital and taxes.

When interested parties are seeking a site for the establishment of an industry they are vitally concerned with the costs of the different productive factors which will go into their product. They want to find, to the best of their judgment, a location which will give them the most economical combination of factors they need and in the quantities and qualities desired. Naturally this will mean a comparison of the total costs of production using one site as compared to other possible locations.

Also, the quantities of each factor to be used is of vital importance. Certain kinds of production use different quantities of each of the factors as compared to other types of production. For instance, oil refining requires relatively large quantities of capital in the form of plants and machinery compared to the number of workers, while an industry such as a clothing factory uses relatively large amounts of labor. Consequently, the prices to be paid those factors which ARE needed in large quantities are more important than the prices to be paid for factors used in limited amounts.

It is proposed here to discuss some of the main constituents, apart from raw materials, which go into a manufactured product and to compare their costs in Alberta with costs in other regions.

Electricity and Fuel

The Place of Electricity and Fuel in Production Costs.

In considering the power factor as one of the principal costs of a manufactured product, it must be recognized that

there are two important aspects in relation to it. One of these is its cost and the other the adequacy of the supply. Of the two, the latter in many cases, is of greater importance due to the relatively small part the cost of power is of the value of the manufactured product.

From a recent report[1] the cost of power for all industries in the United States was shown as 0.8 per cent of the value of the manufactured product. Calculations based on figures released by the Dominion Government indicate that the cost of fuel and electricity for all Canadian industries was only 2.87 per cent of the gross value of production while the same costs for Alberta were only 1.76 per cent. These costs for Western Canada cities were, Winnipeg 1.71 per cent, Edmonton 0.84 per cent, Calgary 2.38 per cent, Regina 2.38 per cent, and Lethbridge 0.79 per cent.[2] It might be interesting to inquire into the differences in these fuel and electricity costs as between say, Winnipeg and Edmonton and Lethbridge. Although the type of industries in the Manitoba centre differ somewhat from those in Edmonton and Lethbridge, it is no doubt true that the low costs in the latter cities are due mainly to the relatively low prices paid for coal and natural gas. On the other hand, cheap hydro-electric power available at Winnipeg tends to offset, to a certain extent, the higher costs of coal there.

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[1] Census of Manufactures, Department of Commerce, United States.
[2] Manufacturing Industries of the Prairie Provinces, 1942.

It has been estimated also that the cost of electricity for making a barrel of flour costing some $5.00 is about 5¢, or about 1 per cent of the value of the manufactured product.[1]

Except for certain industries such as, the pulp and paper, electro-chemical or metallurgical, where electric power is used mainly for purposes other than for mechanical power, the above facts would seem to indicate that fuel and electricity costs are a rather insignificant factor compared with other factors in determining the total cost of the finished product.

Adequacy of the available supply, as was mentioned above, may be of greater importance than cost of power. A manufacturing plant should have available, for instant use small and large amounts of power as the need arises. This requires a location where large amounts of power are available so that individual users' varying demands may be met. Also, if large supplies are available the varying yearly needs may be more adequately supplied for many plants cannot foretell what their future power requirements may be.

Sources of Electricity and Fuel in Alberta.

Electrical power is mainly generated in Alberta from water-power and from fuels such as coal, gasoline, fuel oil (deisel) and natural gas.

Coal is used extensively for power generation where it is found nearby. Edmonton, Drumheller and Lethbridge are the

[1] Proceedings of Midcontinent Research Conference at Minneapolis, Minnesota, 1943. p. 50.

larger producers using coal at present, although the widely scattered coal fields make many other population centres potential users.

Medicine Hat, Wainwright and Vermilion use natural gas as a fuel for electrical energy production, each of these centers being in close proximity to a producing gas field.

All hydro-electric power plants in Alberta are owned and operated by the Calgary Power Company, who had installations totalling over 90,000 h.p. at the end of 1944. This development is all west of Calgary where four power plants, the Cascade plant located near Anthracite, the Horseshoe and Kananaskis plants near Seebe, and the Ghost plant at the mouth of Ghost River generate all Alberta's hydro-power.[1] In addition, there are three large reservoirs impounding about 370,000 acre-feet of water in the vicinity of the producing plants. Additional sites in this general area and in other parts of the Province are available when there is a demand for increased power production. No recent survey has been made of possible water power sites but conservative estimates show that a bare minimum of about 400,000 h.p. could be developed.

In addition to the power already mentioned there are a number of small electrical generating plants using gasoline and deisel fuel oil. In the main, these plants serve small towns and in many instances, are not within economical distances of

[1] The Calgary Power Plant at Prince's Island with a capacity of 2,000 h.p. has not been used in recent years.

the power lines of the larger distributors.

The principal fuels available in Alberta, coal, natural gas and petroleum, have been discussed in preceding parts and there is no need to stress again their abundance or accessibility.

Comparison of Costs with Other Centres.

Although the cost of power is a relatively small element compared with other costs of manufacturing in many industries, it is nevertheless a cost which must be considered.

A comparison of costs of certain types of electrical energy in selected Canadian cities is set out in Table 16. It will be noted that while Edmonton and Calgary have the highest costs of the cities shown for 200 k.w. hrs. consumption of 24-hour commercial lighting service with a 1-kilowatt load, their comparative position improves when 1000 k.w. hours under a 10-kilowatt load is used. In fact, Calgary compares very favorable with Winnipeg, a centre with exceptionally cheap electricity. A comparison of 24-hour small power costs brings the Alberta cities into a still more favorable light. Under a 5 h.p. load and consuming 746 k.w. hrs. of electricity, Calgary and Edmonton rank next to Hamilton on a cost basis. If the load is increased to 100 h.p. and the consumption reaches 7,457 k.w. hours, Calgary and Edmonton show the smallest costs of any of the cities compared, displacing Hamilton which leads for all other types of power shown.

The costs as shown above would seem to indicate that as far as small power requirements are concerned the Alberta centers

Table 16.--Cost of Electricity for Commercial Lighting[1] and Small Power, Selected Canadian Cities, 1942.

Type of Power[2]	Centre	Monthly Bill (net) 24 hour Commercial Lighting		Monthly Bill (net) 24 hour Power Service	
	Load	1 Kw.	10 Kws.	5 H.P.	100 H.P.
	Consumption Kw. Hrs.	200	1000	746	7457
		$	$	$	$
M.F.	Glace Bay	7.00	50.00	19.92	249.14
C.H.	Halifax	7.50	50.00	16.21	224.14
C.H.	Quebec	5.47	33.80	13.35	228.14
M.H.	Hamilton	2.20	18.90	7.26	128.55
M. & CH.	Winnipeg	5.67	27.00	13.62	163.19
M.F.	Regina	7.75	39.25	28.21	214.15
M. H.	Calgary	8.50	29.75	9.14	82.40
M. F.	Edmonton	9.50	37.05	10.69	118.39
C. H.	Vancouver	5.30	33.00	17.21	149.14

[1] Index Numbers of Costs of Domestic, Commercial Lighting and Small Power Services. -- Dominion Bureau of Statistics.

[2] M.F. -- Municipal Fuel; M.H. -- Municipal Hydro; C.H. -- Commercial Hydro.

of Edmonton and Calgary compare favorably with representative cities across Canada. It is recognized that electricity costs vary with the average rate of consumption per day and at different times during the day and during the year. There is no doubt that costs in Alberta cities would considerably lessen if a number of large commercial or manufacturing concerns were added to the lists of consumers.

It is a fact that the costs of hydro-electric power to large consumers located near the generating source is cheap. As Alberta has as yet, only one such plant in operation, the nitrogen plant at Calgary, the average cost of hydro-electric power will tend to be higher to large consumers in Alberta than will such costs to firms more favorably situated.

Coal is used not only as a source of power but also as a fuel for producing heat. Many manufacturing processes call for an application of heat to materials as a part of the manufacturing technique. Although this heat may be produced by electrical means in some cases, there are probably more industries which require heat from coal if only from a cost viewpoint. Also the necessity of heating the premises during the colder months require the use of coal or gas as a fuel, electricity again being too costly for this purpose.

In regard to the costs of coal Alberta presents a very favorable picture. During 1941 the manufacturing industries of the Prairie Provinces used considerable quantities of bituminous coal found only in one of the western provinces, Alberta. Table 17 reveals that the cost of such coal per ton to Alberta industries was only one-half the cost to Manitoba users and

slightly over one-half the cost to manufacturers in Saskatchewan. It is naturally to be expected that Alberta coal will be cheaper to users in Alberta than to users of the same coal in centres more distant from the mines.

Table 17.--Costs of Bituminous Coal to the Manufacturing Industries of the Prairie Provinces, 1942.

Province	Tons Used	Total Cost	Cost per Ton
		$	$
Alberta	52,985	214,052.00	4.04
Saskatchewan	39,295	283,362.00	7.21
Manitoba (Can.)	122,767	994,915.00	8.10
" (Imp.)	9,171	81,123.00	8.84

Source: Manufacturing Industries of the Prairie Provinces, 1942

However, the point seems to be that Alberta has a definite advantage over the other two prairie provinces in respect to costs of the better grades of coal.

Alberta offers a material advantage over any of the other provinces in regard to costs of natural gas. Although only two other provinces produce natural gas in sizable quantities and only Ontario and Alberta in substantial quantities, the cost of the Alberta product is greatly below that of the other two sources, as may be seen from Table 18. Not only in cost but in quantities available does Alberta hold the advantage, for both the Ontario and New Brunswick fields are showing signs of depletion.

Table 18.--Production and Values of Natural Gas[1] in Canada, 1941.

Province	Production	Value	Value per M. cu. ft.
	M. cu. ft.	$	
Alberta	30,905,440	5,175,364	17¢
Ontario	11,828,703	7,140,130	61¢
New Brunswick	653,542	317,437	47¢

[1] Canada Year Book 1943-44 p. 315.

To summarize the points offered above it might be said that:

(1) Alberta does not offer a comparative advantage to large consumers of cheap hydro-electric power. However, the hydro-electric Company now operating in Alberta is willing to quote competitive rates for prospective industrialists wishing to locate in Alberta. For users of certain classes of small power, costs in Alberta compare favorable with other Canadian centres.

(2) Alberta definitely offers a comparative advantage to consumers of coal of various grades and especially to those users whose manufacturing process has a technical preference for that fuel, such as, foundries and machine shops, brick, tile, lime and cement works, etc. Also, where factories and other buildings must be heated during certain seasons of the year a cheap supply of coal in abundant quantities is a considerable advantage.

(3) Alberta has in the case of natural gas a comparative advantage over any other part of the Dominion. Here plenteous supplies are available at costs far below any other region.

Wages.

"From the point of view of production costs and competition the height of money wages and the quality of labor are the vital circumstances. The worker, on the other hand, is interested in the things his wages can buy, his real wages in terms of commodities and services."[1/]

The importance of labor costs is not the same for all industries, for in some, considerable quantities and grades of labor are used while in others only small quantities are necessary. For example, the wages of labor are higher in proportion to the gross value of the product in furniture making, than in, say, sugar refining, the Canadian percentages being roughly 36 per cent and 6 per cent, respectively. In the former case, the cooperating factors of materials and capital are relatively scarce compared to the latter.

How do labor costs in Alberta compare with those in the other provinces of the Dominion? In the comparisons which follow it must be pointed out that only the general trend of wages can be indicated due to the multiplicity of job classifications found in various industries and to the lack of comparative wage statistics.

[1/] Interregional and International Trade, Ohlin B., p. 274.

The wages paid to agricultural workers in the different provinces shows a range of $88 for men and $71 for women as between the highest and lowest paying province (Table 19). Alberta ranks fifth from the top for men and third for women indicating a somewhat median position for both males and females.

Table 19.--Average Wages of Farm Help in Canada,[1] 1941.

Province	Wages per year with Board Male	 Female
	$	$
Prince Edward Island	323	185
Nova Scotia	414	194
New Brunswick	441	162
Quebec	351	171
Ontario	389	233
Manitoba	309	168
Saskatchewan	307	169
Alberta	364	193
British Columbia	373	216
Canada	353	185

[1] Wages and Hours of Labor in Canada, Report 25, p. 146 Department of Labor.

The earnings per day of coal miners for the various provinces show that Alberta miners as a whole receive higher wages than do miners working in other areas. The total yearly wages would not tend to show the same spread, for Alberta miners work on the average fewer days per year than do miners engaged in the other provinces.

Table 20.--Earnings of Coal Miners in Canada, 1940.[1]

Province	Average Wage per Man per Day[2]	Average number of Days worked per man per year[3]
	$	No.
Nova Scotia	3.17	243
New Brunswick	4.96	234
Saskatchewan	3.56	235
Alberta	5.49	211
British Columbia	4.95	250
Canada	4.95	230

[1] Department of Labor, op. cit., p. 101

[2] Figures calculated by dividing number of man days worked into the total wages paid.

[3] Average of the average number of days worked for the years 1936 to 1940 inclusive.

Very few significant differences in wages paid to the various trades and other occupations shown in Table 21, are to be found. In the building trades, Montreal and Halifax wage rates appear lowest, followed by Hamilton, Winnipeg and Edmonton which are about the same and are all below the general average of Vancouver. Edmonton's rates for blacksmiths and machinists are lowest for the cities shown. For the printing trades, Halifax and Hamilton are lowest while Vancouver shows the highest average figure for the group. Edmonton pays about the average for all the cities compared.

Certain civic employees (Firemen and Policemen) receive the lowest wages in Halifax and the highest in Hamilton and

Table 21.--Rates of Wages and Hours of Labor in Various Trades[1] in Certain Canadian Cities, 1941.

		Halifax	Montreal	Hamilton	Winnipeg	Edmonton	Vancouver
		$	$	$	$	$	$
Building Trades[2]							
Bricklayers & Masons	per hr.	1.00	.92	1.05	1.15	1.10	1.22½
Carpenters	"	.90	.81	.90	.95	.95	.97½
Electrical Workers	"	.80	.87	.90	.95	.85	1.10
Painters	"	.75	.74	.75	.75	.80	.80
Plumbers	"	.85	.90	.95	1.05	1.10	1.12½
Sheet Metal Workers	"	.70	.82	.90	.75	1.00	1.07½
Laborers	"	.40	.46	.45	.50	.50	.55
Metal Trades							
Blacksmiths	"	.96	.85	.79	.80	.80	.90½
Machinists	"	.96	1.00	1.06	.85	.75	.95½
Printing Trades							
Compositors (News)	per wk.	35.00	47.00	42.25	41.36	43.20	43.50
Compositors (Job)	"	33.00	44.00	36.00	41.75	42.00	49.40
Pressmen (News)	"	34.00	44.00	41.25	40.80	43.20	52.20
Pressmen (Job)	"	34.25	40.00	38.50	41.30	39.60	42.50
Bookbinders	"	35.00	37.50	40.00	39.00	39.60	48.00
Civic Employees							
Policemen	per yr.	1600.00	1800.00	1943.00	1858.00	1800.00	1901.00
Firemen	"	1600.00	1800.00	1943.00	1858.00	1740.00	1807.00
Laborers	per hr.	.40	.40	.59	.50	.57	.61
Factory Labor							
No. of plants reporting		8	63	30	25	9	28
Wages per hour		.42	.43	.46	.43	.40	.50

[1] Department of Labor, Wages and Hours of Labor in Canada, 1940, Report 25.

[2] In a number of trades where a range of wages is given, the upper limit has been chosen.

Vancouver. Edmonton is slightly under Winnipeg and about on a par with Montreal, although the hours of work are shorter in Edmonton than in Montreal. Apart from Hamilton, civic laborers are higher paid in the Western centres than in the Eastern ones.

The cost of factory labor is comparatively low in Edmonton but it must be realized that the average wage shown by the Table 21 is for a very small group of factories, namely, nine, whereas, apart from Halifax, not less than twenty-five different establishments are included in the average figures given. Also no recognition has been made of the labor force as between male and female workers. A heavier weighting of female employees in certain areas would tend to a lower average wages due to relatively lower wage payments made to women as a group.

A further indication of the comparative labor costs may be had by reference to the per capita wages and salaries paid per week in the Canadian economic areas.

Table 22.--Per Capita Average Wages and Salaries Paid per Week at November 1, 1941, by Economic Areas.[1]

Maritimes	$23.51
Quebec	25.08
Ontario	28.48
Prairie Provinces	27.85
British Columbia	29.17

This table brings out the fact that Ontario and British Columbia workers received the highest per capita wages due

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[1] Labor Gazette, Department of Labor, January 1943, p. 132.

mainly to their more highly industralized production which calls forth a higher money wage. Although the second largest manufacturing province in the Dominion, Quebec, falls below the Prairie Provinces in the average weekly wage paid, there may be several reasons for this, one immediately coming to mind being, a relatively high proportion of women and children working. It is evident, however, that average wages paid to prairie workers are not excessive and from the employer's point of view compare quite favorably with those paid in Ontario and British Columbia.

No attempt will be made here to bring out any qualitative difference there might exist between labor in different parts of Canada. The usefulness, skill and dependability of workers varies greatly in different countries but Canada is sufficiently homogeneous to show little variation in these respects as between provinces. Strikes, labor disputes, etc., occur in each of the provinces and it cannot be justifiably said that any particular province has more than its proportionate share. The average Canadian is an alert, intelligent and industrious worker and under similar working conditions will produce as well in one part of the country as another. Also, the adaptability of Canadian workers across the country, in acquiring new skills readily, as shown by our greatly expanded war production, augurs well for prospective employers no matter where they may wish to locate.

From the point of view of the worker, real wages, as was pointed out above, are what he is primarily interested in,

economically. One measure of the standard of living in Canada, although it has its faults, is the Cost of Living Index as prepared by the Department of Labor. This index as at December 1, 1942 is set out in Table 23.

Table 23.--Index Numbers of the Cost of Living in Certain Canadian Cities as at December 1, 1942.[1]

Halifax	116.2
St. John	117.3
Montreal	120.3
Toronto	116.8
Winnipeg	115.6
Saskatoon	118.5
Edmonton	115.0
Vancouver	116.8

[1] Department of Labor, Labor Gazette, January 1943, p.99.

As this index is prepared from a standard budget of wage-earners and salaried workers earning on the average about $1500 per year, it gives a fairly representative sample of living costs throughout the Dominion. It will be noted that Edmonton had at this date the lowest cost of living figure listed. As this index is constantly changing, Edmonton's position may vary also in relation to the other cities but from a number of different periods inspected within the last few years the position of Edmonton has remained substantially near the lowest index figure.

In looking at a breakdown of these index figures, we find that the main reason for Edmonton's position was the

cost of fuel which was 5 full points below that of the next lowest centre, namely, Halifax. Rental costs were about one-half point above Vancouver, the lowest, and four and one-half points below Winnipeg, the next highest. Edmonton showed the lowest figure for the miscellaneous group and was slightly over the Toronto low for food. For the clothing group, Edmonton was highest and for home furnishings and services was third highest.

In summarizing the labor situation in Alberta the following points are submitted for consideration:

(1) The costs of labor in general in Alberta are about at the Canadian average.

(2) Although there is no large body of employable skilled workers available at present, there are considerable numbers of workers who are capable of learning, in a minimum of time, essential industrial skills.

(3) Alberta has a dry, sunny climate which is stimulating and healthy for energetic workers.

(4) The cost of living in Alberta is as low as found in any other province.

(5) There is available a sizable body of female labor which could be utilized in many light industries.

Interest.

The costs of capital in the form of interest payments are not discussed in this outline in any detail due to the lack of comparable figures for the Canadian Provinces. It is presumed that differences in interest rates do exist for capital employed in Eastern Canada as against capital invested in the Western provinces, due partly to the fact that a large part of the capital is controlled in the East and investment in industries close to the capital source, ceteris paribus, is to be preferred. The more distant the investment the higher the risk element seems and this is expressed in the form of higher interest rates for investments in distant regions. Especially true is this differential rate operative when various forms of instability enter the picture, such as, revolutions, wars, and unstable governments. In case of loans made to these areas of uncertainty an added risk premium is demanded which in the long run should just balance the losses incurred from the additional risks. Professor Black has the following to say about interest rates:[1] "During the early 1920's, local interest rates were nearly twice as high in Montana as in Massachusetts. They were high in all the southern states. For large enterprises, however, eastern capitalsts were willing to invest their capital in the West and South at only slight premiums."

There can be little doubt that the conditions referred to above apply to a certain extent in Alberta as compared to

[1] Production Economics, p. 199.

Eastern Canada. The Province is still relatively new country and even with its abundant natural resources no appreciable capital fund has, as yet, been built up. It takes time to accumulate a capital reserve and in the meantime a lot of the development of the province must depend on sources of capital to be found elsewhere.

Taxes

Taxes influence costs of production as well as the prices of productive factors. Within the boundaries of a particular country, local and provincial taxes are naturally the ones which concern an individual firm or enterprise.

A comparison of the tax levies which a business might be expected to pay by reason of locating in a certain province, city or place presents a number of difficulties. In some instances, the amount of tax payable would depend on the discretion of the assessing body within, of course, the bounds of its authority. A favorable assessment of the land and improvements of an establishment might make a very material difference in the amount of taxes to be paid. Again, in certain places, special levies for community services are not included in the general tax. For example, some cities make an additional charge for garbage removal and disposal while other centres include such costs in the general tax. From the foregoing, it appears evident that a very close study of the tax structure would be necessary in order to adequately appraise the full tax burden to be met in any particular location.
It is proposed, therefore, in the following discussion to merely highlight some of the taxation features of certain Western

Canadian cities; namely, Edmonton, Calgary, Medicine Hat, Saskatoon, Regina, Winnipeg and Vancouver.

In all the cities listed above, the land assessment is based on the fair actual value of the land. Business improvements are assessed in most cases at a certain percentage of the fair actual value. The percentage varies in different localities ranging from 60 per cent of value in Edmonton to 50 per cent in Calgary and Vancouver. Regina make provision for assessing at 30 per cent of the replacement value less depreciation. The mill rates of the cities are not all readily available but for those at hand, Edmonton levied at the rate of 49.5 mills, Calgary at 42.5 mills and Saskatoon at 43 mills.

All cities listed except Vancouver impose a business tax with some variations in each of the centres. Edmonton, Calgary, and Winnipeg assess on the full annual rental value of the land and buildings. Medicine Hat takes 10 per cent of the full assessed value as a basis for assessment but Regina and Saskatoon base their assessment on the floor space occupied. Calgary has a fixed rate of 8 per cent for all types of businesses but both Edmonton and Winnipeg classify by kind of business and levy graduated rates. In addition, Winnipeg breaks down the annual rentals and charges progressive percentages on increasing rental values. For illustrative purposes, a wholesale oil dealer occupying premises with a rental value of, say, $1200 would pay a business tax of $96 in Calgary, $180 in Edmonton and $204 in Winnipeg.

Licenses are collected in most of the cities but their purpose in the main is to regulate and control and so are

usually of a nominal nature. In some of the cities they may be offset against the business tax, e.g., in Edmonton and in Medicine Hat but in others no rebate is allowed, e.g., in Calgary.

In addition to the general tax on land and improvements and the business tax, firms in Alberta are levied on by the provincial government for social services. This tax is assessed on the full value of the land only and is fixed at 3.59 mills.

Special considerations to new concerns starting up within most of these cities have been made in the past but the general policy at present is not to grant any such preferences. In Edmonton power to make any special agreements regarding a reduction in taxes is vested in the City Council. Calgary, on the other hand, requires a majority vote of the rate payers. The preference in most cases takes the form of a fixed assessment amounting to around 25 per cent of the fair actual value. In Medicine Hat special consideration is extended to a large flour mill whose products are for export rather than domestic consumption and in Vancouver a preference is made to certain elevators whose business is the export of grain and grain products.

It is apparent from the material presented above that no definite decision may be reached on the exact amount of taxes a business might have to pay in any of the given localities. The process of finding the best location from a tax point of view would involve preparing specific information

on the type of structure and improvements contemplated and selecting possible sites in different localities. The cost of the building site could be definitely obtained and assuming that the improvements were assessed at the same amount in each of the cities a fairly accurate approximation of the probable property taxes could be made. Once the size and approximate value of the establishment had been decided upon the amount of the business tax could be computed as well. Licenses, where they are necessary, present no particular problem as they are in most cases a specified amount based on the type of business conducted.

MARKETS

Local

The markets for Alberta's manufacturing industries may be divided into different groups. There is first the purely local market for manufacturing establishments catering to the immediate needs of the community. In this category would come bread and bakery products, newspapers, and so on. The size of these producing plants are closely related to the population needs. The next group is particularly concerned with supplying a market wider than a purely local one, in most cases, provincial in scope or even in certain industries export markets. Examples of such industries would be, sugar refining, meat packing, flour milling, pottery and glass, etc. Here the manufacturing establishment is considerably larger than for those supplying purely local markets and certain economies from larger scale production result. When the production from the manufacturing industries exceed the

consumption within the province outside markets must be found.

As yet the market within Alberta is too limited for the large scale manufacturing of certain consumer goods for local consumption. This is a disadvantage to the people of the province because of the necessity of paying a higher price for imported goods.

Due to the similarity between the three prairie provinces in respect of production it would appear that both Saskatchewan and Manitoba offer very limited possibilities for disposal of goods manufactured in Alberta. British Columbia offers better opportunities and there is tendency for trade between these two provinces to increase. In general it would seem evident that Alberta will have to look to the Eastern Seaboard or to export for a market for her excess manufacturing production. This movement of commodities to the coastal regions entails considerable distances requiring carriage by rail and involving transportation costs which have to be met. This brings us to the consideration of transportation conditions within the province and with the outside.

Transportation

Facilities and Costs to User.

Transportation facilities available in Alberta consist of railroads, roads, water and air. At the present time Alberta is served with a fairly complete network of railways reaching most of the accessible parts of the province. The railway mileage is relatively high per capita but comparatively low in respect of the area of the province. A large area in the northern part of the province is practically uninhabited

except for a few Indians and trappers, etc., and this partly explains the relatively low mileage for the province as a whole.

There are three railway lines which might be considered heavy traffic lines, namely, the transcontinental line~~s~~ of the Canadian Pacific Railway passing through Calgary, the transcontinental line of the Canadian National passing through Edmonton, and the branch line of the Canadian Pacific from Calgary to Edmonton. The remaining lines are on the whole medium to light traffic lines and they scarcely pay for themselves.

The Prairie Standard ~~traffic~~ Tariff rates apply to all points on railways between F~~t~~ort. William in the east to Jasper and the Crow's Nest Pass in the west with the exception of places on the Northern Alberta Railway to Waterways. This rate schedule tends to equalize railway transportation costs as between the larger centres and the smaller towns, especially if less-than-carload-lot shipments are involved. However, it is doubtful if the smaller centres are able to take advantage of the reduced rates applicable to carload lot or commodity-rate shipments. This presents one difficulty which a growing manufacturing industry might have to overcome by reason of locating in a small centre of population.

The highways of Alberta consist of about 5,000 miles of surfaced roads and 90,000 miles of earth roads. Of the surfaced roads, 700 miles are of bituminous pavement or

bituminous surfacing and the remainder of gravel or crushed stone. About one-sixth of the earth roads are improved roads. The wide expanse of the province together with the necessity of providing some type of road for outlying areas poses a considerable problem for the public bodies concerned. Large areas in Alberta are in need of any kind of all-weather road and if the plans of the present government are carried out a large increase in surfaced roads serving the more populous areas should result. Good roads have particular significance in relation to local and provincial distribution of manufactured products as well as benefitting the marketing of agricultural and other commodities. It is reasonable to assume that truck transportation in Alberta will greatly expand as it has done elsewhere when more good hard-surfaced roads are available.

Facilities for water transportation are very limited within the province. At present there are river boats operating on the Peace River from the town of Peace River to Fort Vermilion and on the Athabasca River from McMurray down river to the Arctic Ocean. Navigation on both these rivers is confined to a relatively short season due to freezing over during winter.

There are, in addition, two other problems connected with water transportation on the Athabasca River: (1) low water in the late summer when navigation must cease or the boats carry part cargoes, and (2) the 16-mile portage between Ft. Fitzgerald and Ft. Smith.

Freighting by air has been carried on in Alberta for a number of years. This development is confined to the moving of certain types of freight into the North and bringing out furs, mineral concentrates, etc. There has also been some freighting of fresh fish from outlying lakes to the railway. The effect of air transportation in respect of the carrying of freight generally appears, however, to be something only the future can foretell.

From the foregoing it may be seen that transportation in Alberta depends very largely on the railways. Although the freight rate problem as it affects Alberta has not been reviewed, numerous cases could be cited where apparent rate discriminations against places in Alberta exist. Let one suffice. Freight rates on coal from Drumheller to points within a 700 mile distance are 62 per cent higher than rates which apply on coal for a similar distance from Montreal.[1] There can be little doubt that, with Alberta so dependent on railroad transportation, a downward revision of freight rates would be of material benefit in the industrial development of Alberta.

Transportability.

We have already discussed the location of the main consuming centres within Alberta and mention has been made of the transportation facilities available. Given the location of these consuming areas and the transport facilities at hand the transportability of commodities will be a factor affecting production. Production of certain commodities may prove un-

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[1] *Post-War Reconstruction in Alberta*, a brief presented to the Special Parliamentary Committee on Post-War Reconstruction at Ottawa, November, 1943

economical merely because of difficulty of transport. On the other hand, different commodities relatively easy to transport may be economically produced within the area.

Take the case of finished goods; if they are more difficult to transport than the raw materials from which they are made, production will tend to be located near the consumption point. For this reason such commodities as bread and ice cream are manufactured close to the market, and we have production known as "market localized." Conversely, if the raw materials are more difficult to transport than the finished product made from them, there will be a tendency to locate production near the source of the main raw material. This is particularly true if the raw material is "weight-losing", that is, if the larger part of its total weight is discarded when manufacture takes place. In the production of beet sugar, for example, we find that the refineries are situated in the beet growing area, giving rise to what is called a "raw-material localized" industry.

Another aspect of transportability is the fact that certain commodities cannot undergo transportation for long distances due to their perishable nature, e.g., fruits, milk, fish, etc. In any event if they are moved any distance special facilities must be available in order that they may reach the market in sound condition. Many examples are before us each day of goods processed in such a manner as to overcome this perishable feature. Hermetical sealing, quick freezing, and dehydration are all designed to increase the transportability of the perish-

able or bulky product. These techniques have improved the transportability of many commodities and have made their production "raw-material localized."

A somewhat analagous situation in relation to perishability is the movement of Alberta coal. Certain coals mined in Alberta are so friable that they crumble into small pieces when subjected to handling. This property would naturally lead to the consumption of this type of coal near its source. If, however, it were of a suitable nature briquetting or some other processing might be attempted in order to find for it a wider market.

VI. CONCLUSION

It is proposed here to merely indicate some of the main features which present themselves from the foregoing sections of this thesis.

The present pattern of production reveals the predominating place agriculture has in the economy of Alberta. As we have seen nearly two-thirds of all production comes from this one industry. Coming into more prominence is the raising of livestock and other sources of farm income which lessen somewhat the dependence on field crops.

Mining in Alberta means fuels; for coal, oil and natural gas are outstanding. Electric power brings to our attention hydro developments on the Bow River and innumerable possibilities from fuels. Sugar and oil refineries, potteries, salt and fertilizer plants, etc., suggest a beginning toward a wider range of manufactured products.

Agricultural products are Alberta's principal export; it is estimated that 10 out of 13 bushels of wheat grown in Alberta goes to outside points in one form or another and that only one hog in every 5 raised is consumed by Albertans.

Alberta's coal and oil find outside markets as does such manufactured products as,sugar, salt, glass and pottery.

About 55 per cent of the working population of Alberta are farmers. For every seven persons employed in Alberta one is a woman. Women seem to find the service industries suit their talents best, for this group accounts for nearly seven out of every ten women employed.

Although the natural resources are widespread certain areas are identified with particular resources. For lumber we look to the wooded regions of the foothills; for fish, the large northern lakes; for high grade coal, the mountain mines; for oil, Turner Valley; for natural gas, again Turner Valley as well as Viking and Medicine Hat; and for fertile soil the prairie and parkland regions. The manufactures of Calgary and Edmonton we find overshadow the remaining centres in the province. In the high grade black soil zone the rural population has a density of over 9 persons to the square mile.

Many raw materials in accessible areas await future developments. The bituminous sands of the McMurray region constitute probably the largest potential oil field in the world. Alberta could supply Canada's coal requirements at the present rate of consumption for scores of years to come. Costs of production are moderate. Fuel is exceptionally cheap and electrical power is readily available at favorable rates. Wages are not excessive while the cost of living is as low as any place in Canada. Interest rates may be slightly higher than in older settled parts of the country but are not unreasonably out of line. Local taxes in Alberta's cities in comparison with taxes elsewhere do not discourage industrial development.

With a population density of 3.2 per square mile Alberta represents a rather limited local market for her produce. The railway network has a good coverage of the populated area but the fact that of all the surfaced roads in 1942, only 1 mile in 6 was hard surfaced suggests a pressing need. Alberta

stands with the leaders in the movement of freight by air.

It may be with complete justification that Professor Griffith Taylor in a recent article predicted "that Alberta may become the most important province in the Dominion, and that Calgary may surpass Ottawa and even rival London as a focus of the Empire*".